University of Helsinki, Institute of Behavioural Sciences,
Studies in Educational Sciences 250

Anna Tapola

MOTIVATIONAL DYNAMICS IN THE LEARNING CONTEXT

Interaction of individual and situational factors

Academic dissertation to be publicly discussed, by due permission of
the Faculty of Behavioural Sciences at the University of Helsinki
in the lecture hall of Psychologicum (Siltavuorenpenger 1 A)
on the 8th of November, 2013 at 12 o'clock.

Helsinki 2013

University of Helsinki, Institute of Behavioural Sciences,
Studies in Educational Sciences 250

Anna Tapola

MOTIVATIONAL DYNAMICS IN THE LEARNING CONTEXT

Interaction of individual and situational factors

Helsinki 2013

Custos
Professor Markku Niemivirta, University of Helsinki

Supervisors
Professor Markku Niemivirta, University of Helsinki
Professor Patrik Scheinin, University of Helsinki

Pre-examiners
Professor Sanna Järvelä, University of Oulu
Docent Janne Lepola, University of Turku

Opponent
Professor Mary Ainley, University of Melbourne, Australia

Cover illustration
Tuomas Tapola

Unigrafia, Helsinki

ISBN 978-952-10-9364-7 (pbk)
ISBN 978-952-10-9365-4 (pdf)

ISSN-L 1798-8322
ISSN 1798-8322

University of Helsinki, Institute of Behavioural Sciences,
Studies in Educational Sciences 250

Anna Tapola

MOTIVATIONAL DYNAMICS IN THE LEARNING CONTEXT
Interaction of individual and situational factors

Abstract

The purpose of this thesis was to increase understanding about the dynamics of student motivation, focusing on the relations between individual characteristics, the learning context and motivational states. Particular emphasis was placed on the role of students' individual motivational tendencies (i.e., achievement goal orientations) in interpreting and approaching learning situations and tasks. The evolving nature of motivational states was also acknowledged. Accordingly, Study I examined how sixth-grade students (N = 208) with different achievement goal orientation profiles differed in their perceptions of and preferences for the classroom environment. In Study II, the focus was on the changes in and interaction between ninth-grade students' (N = 100) situational interest and self-efficacy during a problem-solving task. An experimental design was used in Studies III and IV to examine the changes in situational interest among fourth to sixth grade students as a function of student and task characteristics. Study III tested the predictive relationships between achievement goal orientations, individual interest, prior knowledge, the task condition and situational interest (N = 57), whereas Study IV focused on the interaction effect of the students' goal orientation group and the task characteristics (N = 140). Studies II, III and IV also examined the predictors of task-related learning outcomes.

Variable- and person-centred methodological approaches resulted in the following findings. First, students with different motivational profiles varied in their perceptions of and preferences for certain features of their classroom environment (Study I). Second, the students' goal orientations and individual interest influenced the arousal of and changes in situational interest during a learning task (Studies III & IV). Third, the evolvement of situational interest and self-efficacy turned out to be interrelated (Study II), and the changes in these constructs during the task to be dependent on both the students' individual characteristics and the task features (Studies II, III & IV). Fourth, students with different motivational profiles investigated in Study IV showed different patterns of change in their situational interest depending on the task condition. In terms of learning outcomes, in addition to prior knowledge or competence, motivational factors also had independent effects on performance. For example,

self-efficacy predicted learning outcomes (Study II), and there were indications that an increase in situational interest had a beneficial effect on learning (Studies II & III).

To conclude, the results indicated that characteristic motivational tendencies influence the way students perceive and interpret environmental cues and approach learning tasks. The evolvement of their motivational states turned out to be dependent on different types of student and task characteristics, and their interaction. Consequently, it is argued that both individual and situational factors, and their possible interactions, should be taken into account when examining students' motivational states and task engagement. The findings also emphasize the importance of recognizing individual differences in students' motivational resources, or lack of them, in everyday learning situations.

Keywords: motivation, achievement goal orientation, interest, self-efficacy, learning task

Helsingin yliopiston käyttäytymistieteiden laitos
Kasvatustieteellisiä tutkimuksia 250

Anna Tapola

MOTIVAATIO OPPIMISKONTEKSTISSA
Oppilaan ja tilanteen dynamiikkaa

Tiivistelmä

Tässä väitöstutkimuksessa tarkasteltiin koululaisten motivaatiota ilmiönä, joka syntyy oppilaan ja oppimistilanteen välisessä vuorovaikutuksessa. Tutkimuksen erityisenä kiinnostuksen kohteena oli se, miten oppilaan yksilölliset motivationaaliset taipumukset (esim. tavoiteorientaatiot) ohjaavat tilannetulkintoja ja oppimistehtävään motivoitumista. Lisäksi tutkimuksissa huomioitiin tilannekohtaisen motivaation muutosherkkyys toistomittausten avulla. Ensimmäisessä osatutkimuksessa (N = 208) tarkasteltiin oppimiseen eri tavoin orientoituneiden oppilaiden kokemuksia heidän oppimisympäristöstään kuudennella luokalla. Toisen osatutkimuksen tavoitteena oli selvittää yhdeksännen luokan oppilaiden (N = 100) tilannekohtaisen kiinnostuksen ja minäpystyvyyden muutoksia ja vuorovaikutusta ongelmanratkaisutehtävän aikana. Kolmannessa ja neljännessä osatutkimuksessa tarkasteltiin sitä, miten oppilaiden yksilölliset ja oppimistehtävän ominaisuudet vaikuttivat tilannekohtaisen kiinnostuksen tasoon ja sen muutoksiin tehtävän kuluessa. Kolmanteen osatutkimukseen osallistui viidennen ja kuudennen luokan oppilaita (N = 57) ja neljäs osatutkimus koski neljäs-, viides- ja kuudesluokkalaisia oppilaita (N = 140). Molemmissa osatutkimuksissa hyödynnettiin kokeellista tutkimusotetta tehtävän ominaisuuksien vaikutusten selvittämiseksi. Osatutkimuksissa II, III ja IV tarkasteltiin myös oppilaiden tehtäväkohtaista suoriutumista selittäviä tekijöitä.

Tutkimuksissa hyödynnettiin sekä muuttuja- että henkilösuuntautunutta metodologista lähestymistapaa. Toisin sanoen, tulokset antoivat tietoa sekä ilmiöiden välisistä yleisistä suhteista että yksilöllisistä eroista niissä oppilaiden välillä. Tulosten mukaan oppimiseen eri tavoin suuntautuneet oppilaat kokivat oppimisympäristön eri tavoin ja myös pitivät erilaisia oppimisympäristön ominaisuuksia tärkeinä (osatutkimus I). Oppilaiden tavoiteorientaatioiden ja yksilöllisen kiinnostuksen havaittiin vaikuttavan tilannekohtaisen kiinnostuksen viriämiseen ja sen muutoksiin tehtävän aikana (osatutkimukset III & IV). Tilannekohtaisen kiinnostuksen ja minäpystyvyyden muutokset olivat yhteydessä toisiinsa (osatutkimus II), ja molempien muuttujien kohdalla tilannekohtainen vaihtelu oli riippuvaista sekä oppilaan yksilöllisistä että tehtävän ominaisuuksista (osatutkimukset II, III & IV). Neljännessä osatutkimuksessa saatiin myös näyttöä oppilaan yksilöllisten ja tehtävän ominaisuuksien välisen interaktion

vaikutuksesta tilannekohtaisen kiinnostuksen muutoksiin; eri tavoin oppimiseen orientoituneiden oppilaiden tilannekohtainen kiinnostus kehittyi eri tavalla tehtäväkontekstista riippuen. Oppilaiden oppimistulosten osalta havaittiin, että olemassa olevan taito- ja tietopohjan lisäksi oppilaiden minäpystyvyys ennusti tehtäväsuoritusta. Tulokset antoivat myös viitettä siitä, että tilannekohtaisen kiinnostuksen nousu tehtävän aikana oli yhteydessä oppimistuloksiin.

Tutkimusten tulosten pohjalta voidaan todeta, että oppilaiden yksilöllinen motivaatio ohjaa tilanteessa syntyviä tulkintoja sekä siinä virittyvän motivaation kehittymistä. Tulokset korostavat oppilaiden yksilöllisten motivationaalisten erojen tunnistamisen tärkeyttä myönteisten oppimiskokemusten tukemisessa.

Avainsanat: motivaatio, tavoiteorientaatio, kiinnostus, minäpystyvyys, oppimistehtävä

ACKNOWLEDGEMENTS

The past years of research and studies, finally culminating in this thesis, have been supported by many people, in and outside the University. The number of people I want to express my gratitude to may tell something about the length of this project but, also, and more importantly, I hope it tells about the nature of the process; much guidance, supervision, peer-support, understanding, and help have been needed to finish it.

It is difficult to try to put into words the influence my supervisor Professor Markku Niemivirta has had on my scientific thinking and development. From the very beginning, his supervision offered the incentives that I needed to become motivated: high challenge, opportunity to question, and a requirement for critical thinking. I believe there is no construct in the field of motivation that we have not discussed or argued about. I thank him deeply for sharing his knowledge with me, for challenging me to think further, and for understanding and appreciating my passion for profound theoretical discussion.

I am grateful to have had Professor Patrik Scheinin as a supervisor already during my Master's studies. I was greatly inspired by his enthusiasm for diverse educational issues and scientific debate; he was also the first person at the University to acknowledge students as the next generation of researchers, urging us to take part in current discussion and conferences. I warmly thank him for showing interest in my progress, and for his habit of always seeing the good sides of things.

During the project, I have been lucky to find talented and innovative collaborators from the University of Turku. I want to thank my co-authors, Marjaana Veermans and Tomi Jaakkola from the Center for Learning Research, for their input and comments on my work. I also want to express my warmest thanks to senior researcher Koen Veermans for suggesting collaboration with his project in the first place. Koen and Tomi have patiently answered my numerous questions concerning science simulations, and offered new insights into my work. It has been a pleasure to work with both of them, and I have always enjoyed visiting Turku. Besides being a co-author, Marjaana Veermans has become a very dear friend of mine. Since the hot days in Leuven in 2000, we have shared not only the challenges and joys of work, but also different events in our personal and family lives. Thank you, Marjaana, for all the support in so many different occasions.

I want to express my sincerest thanks to Professor Sanna Järvelä from the University of Oulu, and Docent Janne Lepola, from the University of Turku, for their willingness to review my thesis. I appreciate their effort, and their

comments were valuable in finalizing the text. I also want to thank Sanna Järvelä for her kind encouragement in the course of my studies. Moreover, she has always been an excellent role model to look up to; when I started my PhD studies, young and internationally acknowledged women in the field of motivation research were scarce. I have also always enjoyed exchanging research experiences and discussing theoretical issues with Janne Lepola.

I feel deeply honored to be given the opportunity to discuss my work with my opponent, Professor Mary Ainley, whose extensive and innovative work on motivation, especially on interest, has inspired me since the very beginning of my studies. As I highly appreciate Professor Ainley's scientific work, and her deep interest in developing motivation research in general, I could not be happier than to have her as my opponent at the public defence of this thesis.

I feel privileged to have been a student at the Doctoral Programme for Multidisciplinary Research on Learning Environments. I wish to thank the Doctoral Programme for providing financial support and high quality courses during the years. Special thanks belong to the scientific leader of the Programme, Academy Professor Erno Lehtinen from the University of Turku, for coordinating such a well-organized and innovative doctoral school. I also want to thank him for his warm support and interest towards my work. This thesis was also financially supported by the grants from the Helsinki University Science Foundation, and the Finnish Cultural Foundation. These grants enabled full-time concentration on PhD studies, and were a valuable encouragement during different phases of the work; I am deeply grateful for this support. I also want to thank the head of the Institute of Behavioural Sciences, Professor Jussi Saarinen, for the working facilities, and Amanuensis Tuomo Aalto, who has taken care of the layout of this thesis.

One of the best advantages of working at the University is to be able to work with and meet people who are truly enthusiastic about what they are doing. My first experience of work in a research group dates back to the time immediately after graduation. Professor Kai Hakkarainen welcomed me to his group, at the time called the Centre for Research on Networked Learning and Knowledge Building. Of this time, I have nostalgic memories of intense discussions and seminars, becoming familiar with new research methods and network of people, as well as a lot of laughter and coffee, and even some salsa dancing. I wish to thank Kai Hakkarainen, Liisa Ilomäki, Minna Lakkala, Jiri Lallimo, Lasse Lipponen, Hanni Muukkonen, Sami Paavola and Marjaana Veermans for these experiences.

More recently, the peers working closest to me have been Antti Pulkka and Heta Tuominen-Soini. Better than anyone else, perhaps, they understand and have shared the different ups and downs of a PhD student's life. I feel extremely lucky that I have got to know them, and to have such wonderful people as my

colleagues and friends. With them, the setbacks have not felt as bad, while the joy of success has been doubled. Heta, I might not have survived this last phase without your help and guidance, thank you for keeping me on track. Special thanks also to Anna Rawlings, who helped me to finalize the language of the Introduction of this thesis. I also want to mention and thank other creative and supportive people whom I have met at the University of Helsinki or elsewhere in the research field: Pirjo Aunio, Annamari Heikkilä, Johan Korhonen (Åbo Akademi), Jonna Malmberg (University of Oulu), and Riikka Mononen.

Conducting research in classrooms is not possible without the effort and help of the teachers and participating students. Therefore, I am grateful to all the students and teachers who took part in the studies.

In addition to people at the University, there are many friends and relatives who, by taking care of my overall well-being or helping with my family, have also contributed to the progress of my work. I thank them all for being there for me. Special thanks go to a group of lovely and strong ladies, Minna-Liisa, Tanja and Virpi, for sharing many memorable moments with me, and tolerating my relatively concise reports on the progress of my thesis.

I grew up surrounded by individual differences, and in an atmosphere where those differences were appreciated and understood. For this, and for their love, I thank my dear parents Jari and Rita. Their example of valuing things for intrinsic reasons has supported me in identifying my own meanings and pursuits in life. My creative, funny, and so very, very dear siblings Lauri, Liisa, Risto and Maria, have always worked as my safety-net, supporting and encouraging me whenever needed. Liisa, your laughter is a necessity in my life, thank you for letting me hear it often enough. I am also grateful to my siblings' wonderful spouses, as well as to my 'family-in-law', for great companionship. Throughout the years, my parents-in-law, Leena and Veikko Tapola, have provided their help with the children, and also offered a relaxing counterbalance for work at their holiday home in Spain. I thank them for all the support.

I have been lucky to have a loving person beside me who has understood my desire for deep knowledge. I am grateful to my husband Lassi for having always encouraged me to carry on with my studies and research, seeing (sometimes even better than myself) its importance for my well-being. Our Awesome Three, Tuomas, Roosa and Elias, give the (funkadelic) rhyme and reason to my life. Although they have always been my number one priority, all of them have also seen me totally absorbed in working with something I have been, and am, very interested in. I hope that they find and experience the same kind of enjoyment in their own fields of interests. The world is such a beautiful and interesting place (most of the time), once you go out into it with an open and curious mind.

Monta tuntia
kirjani ikkunalla,
unohtuneena,
auki. Oikukas tuuli
jos luki jonkin sivun.

(Kotomichi, suom. Tuomas Anhava)

Helsinki, October, 2013
Anna Tapola

CONTENTS

1 INTRODUCTION 1

1.1 The goal perspective on motivation 3

1.1.1 Achievement goals as interpretative frameworks for children's reactions 4

1.1.2 Achievement goals and interactionism 6

1.1.3 Achievement goals and task engagement 11

1.2 Two interests – one emotion? 13

1.2.1 Situational interest as an evolving state 16

1.2.2 Situational interest and self-efficacy 17

1.3 Motivation in context: from classroom goal structures to specific task characteristics 18

1.3.1 Classroom goal structures and achievement goals 18

1.3.2 Task characteristics and situational interest 21

1.4 The present study 25

1.4.1 A summary of the theoretical framework 25

1.4.2 The key constructs 27

1.4.3 Aims 29

2 AN OVERVIEW OF THE ORIGINAL STUDIES 31

2.1 Study I 31

2.1.1 Aims 31

2.1.2 Participants and procedure 31

2.1.3 Measures 31

2.1.4 Analyses 32

2.1.5 Results 33

2.1.6 Discussion 33

2.2 Study II 34

2.2.1 Aims 34

2.2.2 Participants and procedure 34

2.2.3 Measures 35

2.2.4 Analyses 35

2.2.5 Results ... 35
2.2.6 Discussion ... 37
2.3 Study III ... 38
2.3.1 Aims ... 38
2.3.2 Participants and procedure ... 38
2.3.3 Measures ... 39
2.3.4 Analyses ... 40
2.3.5 Results ... 40
2.3.6 Discussion ... 41
2.4 Study IV ... 42
2.4.1 Aims ... 42
2.4.2 Participants and procedure ... 42
2.4.3 Measures ... 43
2.4.4 Analyses ... 44
2.4.5 Results ... 44
2.4.6 Discussion ... 45
3 GENERAL DISCUSSION ... 47
3.1 The main findings of the studies ... 47
3.1.1 The role of motivational tendencies in situational interpretations and motivational states ... 47
3.1.2 The evolvement of and interplay among motivational states ... 50
3.1.3 The contributions of student and task characteristics to motivational states ... 51
3.1.4 The interaction effects between student and task characteristics ... 52
3.1.5 The effects on learning outcomes ... 53
3.2 The theoretical implications ... 54
3.3 Limitations and suggestions for future research ... 55
3.4 Practical implications ... 63
3.5 Conclusions ... 66
REFERENCES ... 67

ORIGINAL ARTICLES

This thesis is based on the following four original publications, which are referred to in the text by their Roman numerals (Studies I–IV):

Study I. Tapola, A., & Niemivirta, M. (2008). The role of achievement goal orientations in students' perceptions of and preferences for classroom environment. *British Journal of Educational Psychology, 78,* 291–312. doi:10.1348/000709907X205272

Study II. Niemivirta, M., & Tapola, A. (2007). Self-efficacy, interest, and task performance: Within-task changes, mutual relationships, and predictive effects. *Zeitschrift fuer Paedagogische Psychologie, 21,* 241–250. doi:10.1024/1010-0652.21.3.241

Study III. Tapola, A., Veermans, M., & Niemivirta, M. (in press). Predictors and outcomes of situational interest during a science learning task. *Instructional Science*. doi:10.1007/s11251-013-9273-6

Study IV. Tapola, A., Jaakkola, T., & Niemivirta, M. (in press). The influence of achievement goal orientations and task concreteness on situational interest. *Journal of Experimental Education*. doi:10.1080/00220973.2013.813370

The original articles are reprinted with the kind permission of the copyright holders.

1 INTRODUCTION

With the aim of enhancing the understanding of student motivation in the learning context, the heart of this work lies in achievement goal theory and the principles of interactionism. In order to grasp an initial image of the proposed theoretical approach, the reader could picture a student wearing certain kinds of motivational lenses, through which they perceive a particular learning situation. These, like all lenses, may be beneficial or maladaptive, depending on their quality and the fit between their characteristics and the context. From this starting point, one can easily continue further, and see that the view the student perceives through the lenses also influences the way he or she reacts and behaves in a certain situation.

The focus of this thesis is on the dynamics of the above-mentioned three basic elements: students' individual characteristics, the learning context, and students' motivational states. Students' individual characteristics are assumed to affect the way they approach the learning situation and task, and to influence the way they interpret situational features. The interaction between the student and the context, in turn, affects the emergence and evolvement of situational reactions. Accordingly, the emphasis is on the dynamic and evolving nature of students' motivational states and the interplay between them.

The assumption of such a reciprocal relationship between the person and the context has strongly influenced the way in which motivation is conceptualized in this work, and how the results of the studies are interpreted. It is argued that empirical studies acknowledging person × context interaction are still scarce, and in order to narrow this gap, the present work concentrates on the dynamics from different perspectives. As a model (or a meta-theory) of personality, interactionism also opens up an approach to motivation as a part of the broader, process-oriented personality system. I have used this model as a guiding framework in my own efforts to make sense of the relations between numerous cognitive, affective and behavioural constructs related to motivation. In the following I discuss the core assumptions of interactionism that I consider relevant to this thesis.

I The relation between the person and the situation is reciprocal

Interactionism postulates that the functioning (overt and covert reactions) of an individual emerges as a result of the continuous multidirectional processes at play between the person and the context (Endler, 1983; Endler, 2000; Heckhausen & Heckhausen, 2008). The fundamental question is about the prime determinant(s) of behaviour; earlier theorizing on personality in the trait

versus state debate juxtaposed the roles of internal (person) vs. external (situation) factors in determining an individual's reactions (for a summary, see Kenrick & Funder, 1988). However, the starting point of interactionism was the inevitable reciprocity between the person and the situation. The effects were not assumed merely to add up and to result in a certain reaction; rather, interdependence between the causes was postulated (Endler, 1975).

II The meaning of the situation is construed subjectively

As a consequence (or a by-product) of the assumed person-by-situation interaction, it is argued that the effects of the context depend on the *psychological meaning* of a particular situation to the individual (Endler, 1975, 1983). Subjective perceptions arise as the significant features of the situation are interpreted through the individual's motivational, affective and cognitive characteristics (Heckhausen & Heckhausen, 2008; Magnusson & Törestad, 1993). These prevailing mental structures (or representations) also influence the situational cues the individual seeks and attends to in the first place (Mischel, 2004; Pervin 1992). Subjective interpretations of the situation set in motion other cognitive, motivational and affective processes that, in turn, work as mediators between the situational features and behaviour. Interactionism thus takes a stand on the *origins of* individual *differences* in situational reactions (overt or covert): the interaction process influences students' perceptions of the situation on the one hand, and the activation of certain internal processes based on those perceptions on the other. In other words, individuals may perceive situations differently, but even similar perceptions may elicit different reactions (Endler, 1983).

III Behaviour is neither stable nor absolutely consistent, but there is a pattern

> *"People do not get bumped from situation to situation, nor do they follow a simple path. - - - There is both stability and variability, stasis and flow, in the behavior of organisms."* (Pervin 1983, p. 2, 3)

Interactionism assumes that an individual's reactions are predictable and coherent without necessarily being stable. Alongside all the variation and even inconsistencies in our thoughts, feelings and actions in different situations, there is an identifiable underlying structure in how we react in *psychologically similar* situations over time (Endler 1975; Mischel & Peake, 1983). This coherence is also reflected in the unique *pattern of changes* in individual reactions across diverse situations. This patterned organization of behaviour has been taken to reflect the goal-directed and self-regulative nature of actions that also partly accounts for the "coherence within inconsistency" (Pervin, 1983). Individuals' actions can be meaningfully interpreted in the light of their enduring values and goal strivings

that give a direction to their endeavours (Mischel & Peake, 1983). Through self-regulation we aim both to pursue our valued aims as well as to maintain an important balance – coherence and continuity of the self, a basic requirement for our behaviour to make sense to ourselves and to others (Mischel, 2004).

Although from the interactionist perspective, the juxtaposing of the person (trait) and the situation (state) in explaining behavioural variance is trivial, it does not imply that it is futile to examine what it is that both of them bring to the interaction. Consequently, interactionism does not deny the existence of relatively stable, trait-like personality structures that shed light on people's responses both to external stimuli and the patterns found in them, in different and similar situations. In the same vein, there is no contradiction in the notion that momentary states do not necessarily parallel the corresponding dispositional tendency, the manifestation of which is also always dependent on the situation (Mischel, 2004).

The focus of this work is not on the stability or consistency of students' reactions *across* situations. However, the notions discussed above lay down the rationale for examining students' motivation through their goal tendencies, acknowledging the role of both the person and the situation in motivational states, and paying attention to students' perceptions. In the following sections, I concentrate on the motivational constructs considered relevant for understanding the arousal, direction and maintenance of students' motivational states in learning situations.

1.1 The goal perspective on motivation

> *"To the extent that we are concerned with the activation of behavior, the direction of behavior, and differential responses to stimuli within the same organism, then we must be concerned with motivational issues."* (Pervin 1996, p. 311)

The centrality of goals in understanding human agency arises from the notion that human behaviour can be characterized in terms of patterning, organization, and direction (Pervin, 1983). Together with the built-in self-regulatory mechanism, goals help to explain the coherence and stability in an individual's actions, and the capability to bring about self-directed change. According to the tenets of interactionism, the nature and hierarchy of an individual's goals guide the organization of other cognitive-affective mental units (Mischel, 2004). Thus, the adaptiveness and meaningfulness of actions can be revealed through the examination of people's long-term or high-order goals.

Goals are understood as mental representations, inner conceptions of some desired outcomes, or end-states that guide people's thoughts, feelings and behaviour (Pervin, 1992). Assuming the existence of such mental images

suggests the partial independence of human responses from the immediate environmental stimuli or instant need satisfaction. The complexity of human behaviour also calls for acknowledging the interplay among multiple simultaneous goals that may be achieved by multiple means, and explains why it is difficult to infer someone's aims solely by observing action or analysing specific, isolated activities (Pervin, 1983).

Within the research on achievement motivation, interest in the guiding but also inhibiting role of students' goals in achievement situations emerged in the late 1970s and early 1980s, and led to certain re-definitions of the concept as compared to the earlier expectancy-value models (e.g., Atkinson, 1964, 1974). First, achievement-oriented behaviour was defined and predicted primarily in terms of students' competence-related goals. Second, despite the reliance on the well-established differentiation between the tendency to approach or to avoid certain achievement-related outcomes, qualitatively different ways of approaching and actively striving for competence were distinguished. In contrast to previous theorizing, it was noted that the goal of avoiding an unfavourable outcome did not necessarily lead to avoidance behaviour, although it may make engagement more tentative and vulnerable to effort reduction. The theme of vulnerability, in terms of impairment in learning and performance, was central in the early research on achievement goals, and gave new insights into the examination of individual differences in students' motivation. Third, it could be argued that the goal perspective on students' achievement motivation arose partly from simultaneous theoretical efforts to understand their reactions and behaviour in achievement situations as a function of the broader self-system (e.g., Covington, 1984; Covington & Beery, 1976; McCombs, 1986). The emphasis was on the interplay among and the organization of different cognitive, affective and behavioural processes and patterns that the goal striving called for (Dweck & Leggett, 1988). It was further suggested that students' responses could be better comprehended when interpreted in the light of their self-regulative efforts to cope with the demands of the situation (Nicholls 1984a): the rationality of their reactions was no longer evaluated solely in terms of the adaptiveness of the outcomes.

1.1.1 Achievement goals as interpretative frameworks for children's reactions

Within the research on motivation, the study of goals, or more specifically achievement goals, has been far from consistent. The proposed conceptualizations are numerous and, as a consequence, research results are somewhat conflicting. Common ground was nevertheless established in the early literature, most notably in the writings of Carol Dweck and John Nicholls who focused on students' higher-order *reasons* for pursuing certain more specific

objectives in achievement contexts. Their work concerned the identification of qualitatively different *classes of goals* behind such academic strivings (Dweck, 1986, 1992). The starting point was the introduction of two main types of achievement goals (learning goals or task involvement, and performance goals or ego involvement), inferred initially from children's differing reactions to failure (Diener & Dweck, 1978, 1980) and developmental differentiation in the conception of ability (Nicholls, 1984a, 1984b).

Although the core of both types of achievement goals was assumed to be in judgments of competence, the essential distinctions involved the definition of success and failure within each goal pursuit. The focus of learning or mastery goals[1] was on competence improvement judged by self-referential standards, whereas in the case of performance goals it was on competence validation by outperforming others, which required the application of normative standards (Dweck & Elliott, 1983; Nicholls, 1989). Children with mastery goals were observed to consider errors or setbacks as part of the learning process and even as useful for further development, whereas for those with performance goals they seemed to indicate failure (Dweck & Leggett, 1988). In effect, the adoption of either class of goals appeared to create a different framework of reference for individual actions, and consequently to result in qualitatively different cognitive and affective processes during learning (Dweck & Elliott, 1983; Nicholls, 1984a).

Apart from identifying distinctive patterns in approaching learning and performance goals, researchers also suggested that competence could be pursued through the goal of avoiding demonstrating low ability. For Dweck and Nicholls this was the case if the child had low expectations of succeeding in demonstrating high ability (Dweck & Leggett, 1988; Nicholls, 1984a). Later on, several contemporary researchers (Elliot & Harackiewicz, 1996; Middleton & Midgley, 1997; Skaalvik, 1997) suggested the more explicit bifurcation of performance strivings into performance-approach and performance-avoidance goals, largely in response to the inconsistency in measurements and findings with regard to performance goals[2].

Alongside these competence-related achievement goals, Nicholls introduced a class of goals that accounted for students' avoidance behaviour and task disengagement in achievement situations. He claimed that repeated experiences of difficulty or setbacks would most likely lead to effort reduction and withdrawal if causes of success were attributed to ability (Nicholls, 1984a). From

[1] Dweck used the term *learning goals,* and Nicholls used *task involvement,* but this work follows the tendency in the current literature and refers to mastery goals.

[2] Later on, the approach-avoidance distinction was extended to the construct of mastery goal, resulting in mastery-approach and mastery-avoidance goal dimensions (Elliot & McGregor, 2001; Pintrich, 2000a). However, given the limited and inconsistent findings it has not been widely adopted in the research on goals (see e.g., Bong, 2009).

the students' perspective, this reaction was understood as an attempt to protect their perceptions of themselves and their abilities by minimizing or avoiding effort expenditure during academic tasks, and thus, providing a legitimate explanation for low achievement (Dweck & Elliott, 1983; Nicholls, 1984a). Nicholls used the terms *work avoidance* and *academic alienation* to refer to such goals (Nicholls, 1989), and the argument for acknowledging them derived from the pragmatic notion of their prevalence and significance in students' classroom experiences. Whereas low expectations in terms of goal attainment were considered the primary reason for the adoption of work- avoidance goals, it was also noted that similar withdrawal might follow if academic achievement did not represent a valuable incentive for the student (Dweck & Elliott, 1983).

1.1.2 Achievement goals and interactionism

The conceptualization of achievement goals in this thesis has its origins in many of the ideas presented in the early goal theorizing. It is also argued that the basic principles of interactionism are compatible with the views of the early goal theorists, and also with more recent perspectives on personality and motivation as a process-oriented, dynamic system (Ainley, 2012; Dweck, 1996; Kaplan, Katz, & Flum, 2012; Pervin, 1996). In the following, some aspects of achievement goal theorizing are considered from the perspective of interactionism.

Goal strivings become activated in interaction between the student and the context

In the early work, achievement goals were conceived of primarily as situationally induced states that students adopt in certain achievement situations. However, both Dweck and Nicholls postulated that certain individual characteristics (e.g., students' conceptions of ability or their self-theories) made children more prone to adopting certain types of goals over others, especially if confronted with some triggering stimulus in the environment. According to Dweck and Elliot (1983), a child enters an achievement situation with particular "cognitive sets" that, together with situational cues and the child's affective states, influence the salience of different goals and the strategies applied to achieve them (cf. *purpose schemas* in Kaplan & Maehr, 2007; see also, Salonen, Lepola, & Niemi, 1998). Person-context interaction in terms of students' goals, and both situational and individual factors, was thus conceived of as generating a specific pattern of situational responses (Dweck & Elliot, 1983; Dweck & Leggett, 1988). Although the interaction-perspective is generally adopted in current research (Hulleman & Senko, 2010; Pintrich, 2000a), it seems that existing conceptualizations still emphasize the context-specific nature of achievement goals (Elliot, Murayama, & Pekrun, 2011; Elliot & Thrash, 2001).

Achievement goals guide students' interpretations of the situation

> *"The worlds students see are, to a significant degree, the worlds they want; their views about the way things are relate meaningfully to their personal goals."* (Nicholls, 1989, p. 100)

Early theories emphasized the role of students' achievement goals in influencing their subjective perceptions, interpretations, and experiences of achievement situations. An individual was assumed to be sensitive to adaptively relevant information, and the relevance was defined, in part, based on the perceiver's goals (Maehr, 1984; Nicholls, 1989). The meaning of the situational cues and characteristics would thus be evaluated and construed in the light of the person's objectives. Consequently, students with different achievement goals were thought to selectively attend to certain situational cues, to perceive them differently, and thus also to react to them differently (Dweck & Leggett, 1988; Nicholls, 1989). This was assumed to apply both to the larger achievement context (e.g., the classroom environment) and to task-specific requirements (e.g., characteristics such as difficulty, challenge and interestingness). According to Dweck and Elliott (1983), students might, for example, interpret the role of instructors differently, depending on the type of goal: those endorsing performance goals might see them as judges of success or failure, whereas for students with mastery goals, they could be helpful guides in their learning process. Similarly, task characteristics could be evaluated in line with their perceived potential in terms of personal improvement, outperforming others, or failure experiences. It should be borne in mind that the relevant cues students were postulated to follow, and attach different meanings to, were somehow related to the content of their dominant achievement goal, and thus constituted the *psychological meaning* of the achievement situation for each student.

Despite the adoption of the term *psychological* or *subjective environment* in the literature on achievement goals (e.g., Ames, 1992a; Ames & Archer, 1988), there have been relatively few studies on the different *meanings* or *interpretations* that students emphasizing different goals might attach to situational cues.

Characteristic goal tendencies and situational goals: compatible or exclusive?

> *"When we think about people, - - -, we perceive meaning and coherence, a consistency that is basic for the construction of personality. Behavior may unfold minding its own business, but it is also constructed into meaningful impressions."* (Mischel & Peake, 1983, p. 244)

That behaviour follows a certain pattern across situations implies that there is also some coherence in an individual's higher-order goals (Pervin, 1983).

Although achievement goals were first identified and considered as situation-specific *goal states* and malleable through context manipulation, both Dweck and Nicholls also referred to the formation of more stable *goal tendencies*. For Dweck they represented certain ″expectancy-value patterns″ that described a student's personal tendency to choose certain goals more likely than others (Dweck & Elliot, 1983). Although not very explicit about the nature or definition of such patterns, she (and her colleagues) suggested referring to person-situation interactions in probabilistic terms: an individual's predispositions would determine the probability of favouring certain goals, but the situation might alter that probability (Dweck, Chiu, & Hong, 1995; Dweck & Leggett, 1988). In the same vein, but even more precisely, Nicholls (1989) postulated the existence of dispositional *motivational orientations* (task and ego), which in his view represented individual differences in proneness to different goal states (task or ego involvement, respectively). Thus, in both cases, dispositions were not defined as fixed variables producing certain consistent effects: instead, their function was rather understood as contingent and partly tied to the situation.

Proponents of this perspective would see no contradiction in acknowledging both stability and variability in students' goal choices, in postulating the existence of both dispositional and situational goal constructs, or in acknowledging the influential role of both the person and the situation in goal formation. However, from early on, there has been a persistent tendency to adopt either the situation-specific perspective on achievement goals, or (more seldom) to focus on generalized tendencies (i.e., achievement goal orientations). Whereas advocates of the former view conceive of achievement goals as specific end-states arising from and adopted in the achievement situation (e.g., Elliot, 1999; Kumar & Jagacinski, 2011), proponents of the latter focus on the habitual goal tendencies with which the student enters the classroom, and that are characteristically emphasized *across* achievement situations (e.g., Niemivirta, 1998, 2002; Pintrich, 2000a; Urdan, 1997[3]). The position taken in the studies has influenced the definition and measurement of achievement goals, the way the role of the environment or the person is conceived, and how the results are interpreted. Current conceptualizations still represent differing perspectives, whilst the operationalizations do not entirely seem to highlight the conceptual differences. For example, in the 3 x 2 achievement goal model (Elliot et al., 2011) that emphasizes the situational nature of achievement goals, the items require students to generalize their *typical* goal strivings in a certain domain. It can be

3 Urdan (1997) argues that achievement goals represent dispositional goal orientations. However, the terms achievement goals and achievement goal orientations are still used interchangeably in the literature, irrespective of the assumed scope of the construct. In this work, I use the term goal orientation only when the focus is explicitly on students' dispositional goal tendencies.

stated that such generalizations, although tied to performance situations within a certain domain, also reflect students' individual tendencies to choose certain types of goals over others.

Empirical evidence has given support to both dispositional and situational perspectives on achievement goals. On the one hand, experimental context manipulations have been successful in influencing the focus of students' achievement goals (Butler, 1987, 2006; Elliott & Dweck, 1988; Kumar & Jagacinski, 2011). On the other hand, however, longitudinal perspectives with varying measurement intervals have indicated moderate to high stability in achievement goals or goal orientations within the school term or across the academic year (Anderman & Anderman, 1999; Bong, 2005; Fryer & Elliot, 2007; Shim, Ryan, & Anderson, 2008; Young, 1997), and even across educational transitions (Tuominen-Soini, Salmela-Aro, & Niemivirta, 2008, 2011, 2012, see also Tuominen-Soini, 2012 for a thorough discussion on stability and change in achievement goal orientations). In terms of reflecting different levels in an individual's goal hierarchy, the results are compatible with the interactionist perspective on achievement goals.

Identifying what a person characteristically tries to do

In interactionism, the core of the personality is seen to lie in the relatively stable *organization of and interaction* among cognitive and affective mental representations or "units" (Mischel & Shoda 1995; Mischel, 2004). As outlined in previous sections, students' achievement goal orientations could be considered to represent one class of such representations, which are also assumed to lead to different cognitive and affective response patterns. The activation of certain representations (e.g., mastery goals) is assumed to further activate other cognitive-affective processes in the personality system, and finally, to produce patterns of thoughts, feelings and behaviour that are characteristic to the person concerned. The focus of interest is thus in interpreting certain representations in relation to other simultaneously activated units; it is the organization and dynamics of these processes that presumably underlie an individual's habitual response patterns (Bergman & Magnusson, 1997). Within this perspective, the identification of individuals representing certain personality characteristics is based on similar underlying dynamics and the organization of the mental units that are relevant to the characteristics in question. Capturing such categorizations would require the identification of groups of individuals with similar profiles with regard to certain personality variables (Bergman & Anderson, 2010; Magnusson & Törestad, 1993).

A person-centred methodological approach – with certain analytical tools – was thus developed in line with these theoretical notions (Bergman & Magnusson, 1997; Magnusson & Törestad, 1993). The predominant research

orientation examining relations between certain distinctive personality variables was criticized for eliminating the person – the characteristics of an individual – from personality theories. In contrast, the main interest of the person-oriented approach was, and remains, in the specific pattern of factors that describe the dynamics of certain individual features (Bergman & Anderson, 2010).

With regard to motivational processes, and achievement goals in particular, already the early theorists proposed that all individuals have the various goal tendencies in their repertoire, and that in an achievement situation, different goal states may exist simultaneously (Dweck & Elliott, 1983; Nicholls, 1989). What makes the difference is individual sensitiveness in the activation of different tendencies, and the emphasis given to different goals (Dweck, 1996). Although the *multiple goal perspective* (Pintrich, 2000b) was re-introduced into the discussion in the early 2000s, it was not until quite recently that the person-centred methodological approach explicitly started to attract more attention (e.g., Daniels et al., 2008; Niemivirta, 2002; Tuominen-Soini et al., 2008, 2011, 2012). The focus in these studies is on identifying groups of students with similar achievement goal orientation profiles; in other words, configurations that show the emphasis given to each goal dimension.

Despite the differences in the number of groups and identified goal orientation profiles across the studies, a reasonable consensus about the adaptiveness of certain combinations of orientations has emerged. With regard to both students' achievement and affective outcomes, it seems that, even when accompanied with a mastery orientation, emphasizing performance-related orientations may have detrimental effects on students' well-being (Daniels et al., 2008; Luo, Paris, Hogan, & Luo, 2011; Tuominen-Soini et al., 2008, 2011, 2012). Moreover, the students with a dominant avoidance orientation have been characterized as having a maladaptive outcome profile (Kolić-Vehovec, Rončević, & Bajšanski, 2008; Niemivirta, 2002). In contrast, the combination of a high mastery and low performance orientation seems to produce the most beneficial educational outcomes, especially when students' emotional well-being is also considered (Schwinger & Wild, 2012; Tuominen-Soini et al., 2008, 2011, 2012).

However, it should also be noted that, alongside the individual differences in emphasizing the different goals or goal configurations, there are also some identifiable developmental patterns among students in different age groups. Mean-level differences show that the younger the students are the stronger the emphasis on mastery goals, whereas the average level of performance goals is likely to increase after the transition to middle school (Anderman & Anderman, 1999; Anderman & Midgley, 1997; Eccles & Midgley, 1989; Urdan & Midgley, 2003). It has also been observed that mastery and performance-approach goals correlate more strongly within elementary school samples than in samples

comprising of older students (Bong, 2009). These differences have been attributed to the developmental changes in students' conceptions of the relations between ability, effort and performance outcomes. The conceptions of learning and performance still partly overlap among young students, and effort is seen as the prime cause of outcomes (Anderman, Austin, & Johnson, 2002). However, as the conceptions of effort and ability start to diverge, during adolescence lower effort tends to imply higher ability, a conception that supports the endorsement of performance goals (Nicholls, 1984b). Furthermore, grade-related changes in the students' learning context and in teaching practices (a stronger focus on normative evaluation and performance) probably contribute to age-related developmental trends (Anderman & Maehr, 1994; Eccles, Wigfield, & Midgley, 1993).

1.1.3 Achievement goals and task engagement

> *"In thinking, one needs to be concerned with the problem, not with one's self."* (Asch, 1952, p. 304)

Given that one of the main areas of interest in this thesis concerns the role of students' motivational characteristics in their task-specific reactions, I will concentrate on reviewing empirical achievement goal research from this perspective. As discussed above, student affect, thought and action in classroom situations, and task engagement are assumed to form coherent patterns and to occur in relation to higher-order goals. The interplay between goal tendencies and their associations with other personality structures creates a mental framework, within which to interpret and respond to situational cues. Thus, it is claimed that the endorsement of different goals influences the *focus* of students' cognitions (e.g., information seeking and processing), and differently engages their emotional resources during a learning task. In effect, it could be stated that, whereas students emphasizing mastery goals focus on the task (process), those with predominant performance goals are mainly concerned with the outcome (product), and it is their self-attributes (e.g., the adequacy of their abilities) that are at stake.

Empirical evidence concerning personal achievement goal tendencies and corresponding goal states supports the existence of certain characteristic response patterns. During learning tasks, mastery goals have been found to be associated with high effort and persistence – and an increase in them – in the face of obstacles (Kumar & Jagacinski, 2011; Sideridis & Kaplan, 2011), the flexible use of problem-solving and self-regulation strategies (Elliott & Dweck, 1988; Sins, van Joolingen, Savelsbergh, & van Hout-Wolters, 2008), and a willingness to choose challenging tasks in order to maximize learning (Crocker, Brook, Niiya, & Villacorta, 2006; Elliott & Dweck, 1988). Although some studies

report an association between performance-approach goals and effort expenditure (Elliot, McGregor, & Gable, 1999), reduced effort has been shown to be more likely after failure experiences (Grant & Dweck, 2003; Kumar & Jagacinski; 2011; Sideridis & Kaplan, 2011). When focused on performing better than others, students are also less likely to choose challenging tasks if the possibility of public failure exists (Elliott & Dweck, 1988). Mastery and performance-approach goals have been reported to contribute to task performance and more general academic achievement (Kumar & Jagacinski, 2011; Tuominen-Soini et al., 2011), although there are also inconsistent findings on the effects (see Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Linnenbrink-Garcia, Tyson, & Patall, 2008). In contrast, studies show that performance-avoidance and work-avoidance goals are related to a number of maladaptive processes during studying and task engagement: low effort and persistence, shallow information processing, a tendency to give up on demanding tasks, and poor performance outcomes (Elliott & Dweck, 1988; Kumar & Jagacinski, 2011; Niemivirta, 2002; Sideridis & Kaplan, 2011).

Besides cognitive processes, experiences of negative and positive affect vary, and seem to derive from different sources as a function of students' achievement goals. The endorsement of mastery goals has been found to predict positive affect (e.g., enjoyment and excitement), and even to strengthen it, *during* engagement and after success (Kumar & Jagacinski, 2011; Tulis & Ainley, 2011). Although positive affect (e.g., pride and hope) may also accompany performance-approach goals (Pekrun, Elliot, & Maier, 2009), especially after success (Sideridis & Kaplan, 2011), some studies report associations with negative emotions (e.g., test anxiety: Luo et al., 2011; Tyson, Linnenbrink-Garcia, & Hill, 2009). Emphasis on both dimensions of performance-related goals has been associated with experiencing negative affect following failure, whereas mastery goals have been related to positive emotions even after failure (Tulis & Ainley, 2011). Performance-avoidance goals, in turn, have been found to correlate with stress and several negative emotions (e.g., anxiety, anger and shame: Pekrun, Goetz, Titz, & Perry, 2002; Pekrun, Elliot, & Maier, 2006). The desire to avoid expending effort and to minimize academic work (i.e., work-avoidance goals) has been shown to negatively predict enjoyment and positive affect, and to positively predict negative affect and, for example, escapist thoughts during task engagement (Duda & Nicholls, 1992; Kumar & Jagacinski, 2011). It has also been found to positively correlate with experiencing boredom and more general dissatisfaction with school (Duda & Nicholls, 1992; Nicholls, Patashnick, & Nolen, 1985).

In sum, a focus on mastery goals in achievement situations seems to provide students with more sources of and opportunities for rewarding experiences and emotions, and to secure the focusing of attention on the problem at hand. When

performance concerns predominate, worries related to the possibility of failure cast a shadow over concentration, and restrict the opportunities for positive and enjoyable experiences during and after the task. One essential difference characterizing these processes seems to be whether the engagement is conceived of as an end in itself, and consequently as intrinsically satisfying, or as a means to an end and thus motivated mainly by certain extrinsic reasons. According to Nicholls (1989), Atkinson's expectancy-value model of motivation failed to deal with this distinction, and thus also neglected one of the key concepts accounting for inherently motivated action: interest.

1.2 Two interests – one emotion?

> *"- - -interest is personal; it signifies a direct concern; a recognition of something at stake, something whose outcome is important for the individual."* (Dewey 1913, p. 160)

According to well-established theoretical notions and empirical evidence, interest could be conceived, on the one hand, as an enduring personal meaning and relation developed towards a certain domain content or activity (i.e., individual interest), and on the other hand, as a context-specific motivational state that emerges in interaction with a given content object (i.e., situational interest). In other words, interest represents both a key motivation for activity and a process that characterizes the motivational intensity and quality of students' situated academic engagement (Ainley, 2012). Interest provides action with energy and connects it with personal significance, relevance and value. Both these forms of interest (i.e., individual and situational) are rooted in the phenomenological experience of *being interested* (i.e., a psychological state of interest).

Both interest constructs also share certain characteristics, while still differing in their temporal scope. First, interest is inevitably relational: it has an object (e.g., a subject domain or activity), and in a certain sense is manifested only in ongoing interaction with that object (Valsiner, 1992). Second, once activated, the object of interest occupies the mind and is in the direct focus of attention and concern (Hidi, 2006). Third, interest has a process-oriented nature: it evolves and develops over time but may also diminish and fade out (Ainley, 2010; Ainley & Hidi, 2002). This development has been described in terms of certain distinctive, sequential, partly overlapping phases that differ qualitatively from each other (Hidi & Renninger, 2006; Renninger & Hidi, 2011). These proposed phases are different in the cases of individual and situational interest, but it has also been suggested that – under favourable circumstances – they may form a continuum from a momentary experience to a more stable and internalized

relation towards a certain object. Fourth, when conceived of as an emotion (a psychological state or feeling), interest is postulated to have a positive, stimulating valence (Fredrickson, 2001), although it may co-exist with different combinations of emotions, some of which may be negative (e.g., anger, see Ainley, 2010). Nevertheless, even momentary experiences of interest are likely to elicit subjective feelings of satisfaction that, in the case of individual interest, may turn into enduring sources of personal well-being (Fredrickson, 2001).

Interest, whether individual or situational, has been related to a number of significant educational outcomes. The development of individual interest is generally thought to be closely intertwined with increased knowledge about the object in question, and empirical evidence supports this link. Students with a well-developed individual interest in a certain domain or school subject seem to think they are good at it, are knowledgeable about it, and also perform well in that or closely related subjects (Denissen, Zarrett, & Eccles, 2007; Renninger, Ewen, & Lasher, 2002). Being interested in a domain also increases the likelihood of having a positive attitude towards related school subjects and of conceiving them as important and useful (Ainley & Ainley, 2011; Hulleman, Durik, Schweigert, & Harackiewicz, 2008). Moreover, individual interest facilitates the emergence of situational interest, and is thought to be critical in maintaining a state of interest in situations in which the motivational support from the environment (e.g., teacher, classroom or task characteristics) is weak (Hidi & Renninger, 2006). With regard to situational interest, there is evidence of associations with, for example, attention focusing and persistence, positive affect, effective self-regulation and self-efficacy (Ainley, Buckley, & Chan, 2009; McDaniel, Waddill, Finstad, & Bourg, 2000; Vollmeyer & Rheinberg, 2006). Its contribution to performance outcomes also seems to be beneficial: situational interest has been shown to promote, for example, text recall and comprehension (Hidi, 2001; Sadoski, 2001; Schraw, Bruning, & Svoboda, 1995). However, rather than being direct, the effect seems to be mediated through engagement behaviour (Ainley, Hidi, & Berndorff, 2002; Rotgans & Schmidt, 2011).

Given this picture of associations, it is evident that, as with students' achievement goals, students' interests (whether predisposition or state) guide their information processing, interpretations and affective responses in learning situations. In the same vein as mastery goals, the activation of interest seems to further activate certain cognitive-affective patterns that are beneficial to learning. Moreover, as Nicholls notes, it seems that the emergence or co-existence of interest is highly probable, once mastery goal focus has been activated. Although research traditions in the fields of achievement goals and interest have long followed their own, separate paths, interest in the interplay between these constructs has arisen during the last decade (Hidi & Harackiewicz, 2000). Current studies on different levels of analysis support the

notion of reciprocal relations between the constructs: personal achievement goals and interest influence students' situational goals and interest, which in turn may reinforce more stable goal and interest tendencies (Ainley & Patrick, 2006; Harackiewicz, Durik, Barron, Linninbrink-Garcia, & Tauer, 2008).

Mastery achievement goals, and in some studies performance-approach goals, have been shown to positively predict students' situational interest (Ainley & Patrick, 2006; Daniels et al., 2008; Grant & Dweck, 2003; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Hulleman et al., 2010). Although some studies report null correlations between performance-related goals and situational or course-specific interest (Harackiewicz, Barron, Tauer, & Elliot, 2002; Hulleman et al., 2008, Lau & Nie, 2008), the effects of performance-avoidance and work-avoidance goals are generally negative (Graham, Tisher, Ainley, & Kennedy, 2008; Harackiewicz et al., 2008). Performance-approach and performance-avoidance goals have also been associated with experiencing boredom during academic work, whereas the relation is negative with regard to mastery goals (Pekrun, et al., 2009). The association between personal achievement goals and individual interest also parallels these findings (Hulleman et al., 2008; Lau & Nie, 2008), although conceptions of the direction of causality between achievement goals and interest vary across the studies.

Again as Nicholls notes, one way of interpreting these associations is in terms of whether the focus of endeavours is on the process or on the outcome of learning. In the latter case, the reward to be gained from the work is contingent on success, and fear of failure may undermine feelings of enjoyment or interest. This seems to be the case especially with performance-avoidance goals. Students with dominant performance-approach goals may experience positive feelings, and also develop an interest, if their progress towards performing well seems secured. However, if success appears unlikely, their interest may easily flag due to their at least partial dependence on rewards that are extrinsic to task engagement. Academic work seems, on the one hand, to provide the students who emphasize work-avoidance goals with the fewest incentives or rewarding experiences, perhaps due to the lack of value attached to any academic outcomes, whether extrinsic or intrinsic. On the other hand, in the case of mastery goals, the ends and the means of the activity (i.e. learning) are of equal value: the reward is inherent in the process of engagement (Dewey, 1913). Striving towards learning, and showing interest in the content, seem to be mutually activating and supportive in a cyclical way that is highly beneficial for deep learning.

However, even if supported by individual motivational tendencies, the level of situational interest during studying and task engagement may be subject to change.

1.2.1 Situational interest as an evolving state

> *"It is not enough to catch attention; it must be held. It does not suffice to arouse energy; the course that energy takes, the results that it effects are the important matters."* (Dewey, 1913, p. 195)

The early research on situational interest focused particularly on the *interestingness* of the situation or task characteristics that were thought to elicit a short-lived state of interest across individuals (Hidi, 1990; Mitchell, 1993; Schraw et al., 1995). Along with the accumulating evidence on the role of individual factors in eliciting situational interest, however, the focus switched to the interaction between the person and the context. It was acknowledged that even though the stimulus (or trigger) exists in the situation or task, students react to it based on individual characteristics such as gender, prior knowledge and individual interest (Ainley et al., 2002; Durik & Harackiewicz, 2007; Hidi, Berndorff, & Ainley, 2002). These individual factors were found to influence the level of aroused situational interest, the choices the students made during their learning, and the quality of engagement.

Situational interest, its associates and outcomes have been examined both from a more general, classroom or course-level perspective, and in relation to a specific task. It is acknowledged that the situational interest aroused at the beginning of an activity (also called the triggered, or the *catch* phase) is in some respects different from a state that is maintained throughout a learning period or task (Bergin, 1999; Harackiewicz et al., 2000; Mitchell, 1993). Although there has been less research on the evolvement of situational interest, studies using repeated measures of the state of interest during a certain learning task or episode have started to emerge (Ainley, Corrigan, & Richardson, 2005; Moos & Azevedo, 2008; Palmer, 2009). It has been shown that the intensity of students' involvement, reflected in mean levels of situational interest, fluctuates during different phases of engagement. Study findings also indicate that the level of aroused interest may start to decrease as students proceed with their learning activity (Ainley & Hidi, 2002). At the same time, however, measures of sequential interest seem to predict each other: once a positive connection has been formed, it is likely to be relatively stable (Ainley, 2012). Thus, although there seems to be both inter- and intra-individual variability in the level of situational interest, the rank order based on the aroused level of interest appears to hold. Some of the studies have traced the sources of the evolvement to certain situational characteristics or changes in instructional practices (Palmer, 2009; Rotgans & Schmidt, 2011).

As already noted, students' individual characteristics also play a role in the emergence of situational interest. Gender differences are evident in the aroused level of interest in different topics or domain contents (Ainley, Hillman, & Hidi,

2002; Graham et al., 2008). These differences parallel those found between genders in individual interest domains (Hoffmann, 2002) that appear to exist when children start school (Meece, Glienke, & Burg, 2006). Whereas boys tend to show a higher interest in science and technology, girls are more interested in human functioning, languages and reading and writing. Prior knowledge, in turn, supports interest arousal in easing the initial attention-focusing and comprehension formation (Alexander, Jetton, & Kulikowich, 1995; Durik & Matarazzo, 2009). However, much less is known about how these individual characteristics influence the *maintenance* of situational interest throughout the task. Moreover, fewer studies focus on the *interaction* of situational and individual factors in the development of situational interest.

1.2.2 Situational interest and self-efficacy

One approach to examining the maintenance of situational interest is to focus on other simultaneous cognitive-affective processes that might either support or interfere with it. One such process that has attracted some attention, apart from students' emotions (see Ainley, 2012), is self-efficacy: a student's subjective judgement about the probability of being able to execute a certain task or activity (Bandura, 1997; Pajares, 1996). Self-efficacy, like interest, has been linked to strategy use, persistence, effort, and quality of performance in academic settings, for example (Bandura, 1993; Bandura & Schunk, 1981; Bouffard-Bouchard, 1990; Williams & Williams, 2010; Zimmerman & Bandura, 1994). Partly because of the overlapping empirical findings, there has been a demand for studies on the interrelations among these constructs, as well as for process-oriented measurement of them.

Several studies have shown a positive association between students' self-efficacy and interest (Ainley & Patrick, 2006; Hidi et al., 2002), but few investigate the developmental reciprocity in the course of a specific learning task. However, existing studies and theoretical reasoning suggest interdependence: a certain threshold for self-efficacy needs to be exceeded for the activity to evoke interest (Bandura, 1986). Still, mere self-efficacy does not suffice to make an activity interesting, and high levels of efficacy beliefs may even work in the opposite direction, by making the task boring. Silvia (2003) posits that the uncertainty related to moderately difficult tasks and medium levels of self-efficacy functions as a mediator between self-efficacy and interest. Ainley and colleagues (2009) also found that, depending on the nature of the task, the interrelations and mutual effects of self-efficacy and interest varied in different phases of the task (Ainley et al., 2009). Conversely, it is also possible that finding interest in the task results in more effort being put into it, and consequently increases the likelihood of experiencing progress and mastery – the main sources of self-efficacy beliefs (Bandura, 1997). As noted, both

constructs have been independently found to contribute to students' task outcomes, but knowledge about the effects of their interaction on performance is lacking.

In effect, the studies on changes in situational interest and self-efficacy during learning illustrate the probabilistic and complex nature of the interrelations between co-existing motivational processes. Both constructs are assumed to emerge in interaction between the person and the context, and their interplay and maintenance during engagement also seem to depend on that interaction.

1.3 Motivation in context: from classroom goal structures to specific task characteristics

According to the interactionist perspective adopted in this thesis, the immediate achievement situation (e.g., the classroom environment) and its features are interpreted through students' individual characteristics, such as their motivational tendencies. However, this does not exclude the possibility of consistent or coherent situational perceptions or experiences among students. Strong and pervasive situational cues may override habitual cognitive-affective activation patterns, capture students' perceptions, and guide goal adoption and subsequent covert or overt responses. This perspective is highlighted in the following sections.

1.3.1 Classroom goal structures and achievement goals

From the very onset of research on achievement goals, the role of the achievement context in shaping students' goal adoption has been examined from several perspectives: students' subjective perceptions of the classroom environment (Ames & Archer, 1988; Urdan, Midgley & Anderman, 1998), classroom observations and interviews (Marshall, 1987a; Patrick, Anderman, Ryan, Edelin, & Midgley, 2001), experimental context manipulations (Butler, 1987; Elliot & Harackiewicz, 1996), and comprehensive classroom or school level interventions (Ames, 1992b; Maehr & Anderman, 1993). A crucial consideration in all these approaches is whether or not the context, classroom norms and rules, and teacher practices include elements that reflect aims towards learning, effort and improvement on the one hand, and normative performance and competition on the other. These two dimensions were labelled *mastery* (or task) and *performance goal structures* (Ames & Archer, 1988), and were thought to elicit corresponding personal goal patterns in students. The practical purpose was to identify classroom practices and cues that made the goal messages salient, and consequently to find ways of orienting students towards adopting dominant mastery goals. To reach this aim, Ames (1992a, 1992b) adopted the acronym

TARGET to describe how certain practices in the classroom (i.e., *Tasks, Authority, Recognition, Grouping, Evaluation and Time*) could convey to students goal messages emphasizing either mastery or performance.

Close to three decades of research on classroom goal structures has produced a vast amount of knowledge on their associations with numerous student characteristics and educational outcomes. The most active area of research concerns students' self-reported perceptions of their classroom goal structures. Studies have found evidence of the expected relationships: a perceived mastery goal structure has been associated with adaptive, and a performance goal structure most often with various maladaptive motivational, cognitive and behavioural outcomes. The former is positively related, for example, to students' personal mastery goals, the use of adaptive learning strategies, positive school-related affect, self-efficacy, interest and academic achievement (Bong, 2008; Kaplan & Maehr, 1999; Lau & Nie, 2008; Wolters, 2004; Young, 1997). A perceived performance goal structure, in contrast, has been associated with personal performance-approach and performance-avoidance goals, self-handicapping, avoidance of help-seeking, procrastination, disruptive behaviour, cheating, and school-reated negative affect (Kaplan, Gheen & Midgley, 2002; Turner et al., 2002; Urdan et al., 1998). Most of the studies are cross-sectional in nature, thus the analyses are based on the observed correlational patterns. It is argued that despite the focus on students' subjective perceptions of classroom goal structures in these studies, the role of the environment in determining goal adoption has been over-emphasized, and the meaning of students' perceptions misinterpreted.

First, the results of most studies based on concurrent measurements of perceived goal structures and personal achievement goals have been taken to indicate an environmental influence on students' goal adoption and other outcomes (Ames & Archer, 1988; Bong, 2008; Church, Elliot, & Gable, 2001; Greene, Miller, Crowson, Duke, & Akey, 2004; Gonida, Voulala, Kiosseoglou, 2009; Schwinger & Stiensmeier-Pelster, 2011), thus ignoring the possible reciprocal relation and alternative interpretation suggested by the early achievement goal theorists: students who emphasize different goals may perceive and interpret their environment differently. A few studies have taken the possibility of such a bidirectional relation into account, and for example Kaplan and colleagues (2002) found that students' personal achievement goals predicted their perceptions of the congruent classroom goal structures. Second, and even more importantly, in many studies (Anderman & Young, 1994; Gonida et al., 2009; Kaplan & Midgley, 1999; Roeser, Midgley, & Urdan, 1996; Sungur & Senler, 2010; Walker, 2012) students' perceptions of the environment are used as a basis for drawing practical implications and suggesting interventions aimed at changing the "actual" classroom environment. On this level, the theoretical

principle of acknowledging students' subjective experiences in the first place seems futile. What also goes unnoticed is empirical evidence showing that students in the same classroom may perceive instructional practices and teacher behaviour differently (Deemer, 2004; Kaplan et al., 2002; Urdan, 2004). Some studies have also tended to regard students' personal achievement goals as factors mediating the effect of perceived goal structures on different outcomes, instead of considering their potential role as moderating the relationships between perceptions and outcomes (see Murayama & Elliot, 2009 for an exception).

However, the point of this criticism is *not* to deny the impact of the environment or to exaggerate the variety of students' perceptions within the classroom. Observational studies have shown that students' dominant achievement goals and engagement tendencies could be used as a basis for distinguishing between classes, and that there are identifiable differences in teachers' practices (e.g., in feedback, evaluation and discourse: Anderman & Young, 1994; Meece, 1991; Turner et al., 2002). Students' perceptions of goal structures have also been found to be relatively congruent with observational analyses of teacher practices (Patrick et al., 2001). Moreover, there is evidence suggesting that teachers hold different conceptions of learning and implicit theories of intelligence (i.e., the extent to which ability is conceived of as a fixed entity vs. a malleable characteristic of a person), and this is further reflected in their views on the purposes of education and their practical instructional decisions (Butler, 2000; Marshall, 1987a, 1987b, 1988; Shim, Cho, & Cassady, 2012). It is highly probable that these meanings also shape students' belief systems concerning the objectives of learning, achievement and academic work.

Research results also indicate that the extent to which students in a classroom share the same experiences varies: when there are strong and clear goal messages their perceptions may be more consistent (Urdan, 2004). In support of this, Lau and Nie (2008) found that peer-perceived classroom goal structures meaningfully predicted students' motivational outcomes (e.g., engagement, effort withdrawal and avoidance coping). However, it is also likely that some dimensions of the classroom environment are perceived more inconsistently than others, and that students with certain characteristics are more prone to noticing and taking certain classroom cues than other students (Urdan, 2004). Evidence of this kind is scarce, but the results of Lau and Nie's (2008) study point in that direction: when the classroom was rated as emphasizing performance goals, the positive relation between performance-avoidance achievement goals and maladaptive outcomes, and the negative relation with adaptive motivational outcomes were reinforced. Thus, a strong emphasis in the classroom on the normative comparison of performance and ability was likely to affect the engagement patterns of students scoring highly on

performance-avoidance goals. Because the debilitating reinforcing effect of the focus on performance only concerned the association patterns among personal performance-avoidance goals and the outcome variables, it may be that these students were more vulnerable to the performance cues in the classroom than others. Thus, classroom goal structures may not influence all students in the same way.

The argument put forward here reflects the concern expressed by several motivation researchers (Turner & Patrick, 2008; Urdan & Turner, 2005): efforts to change educational practice in order to promote student motivation too often end up with ″less-than-optimal results″ (Kaplan et al., 2012, p. 165). There may be several reasons for this, but it is suggested that one of the problematic conceptions is ″the same fits all″ perspective, or the assumption that ″the same″ is interpreted and experienced similarly by all students. Even though it seems possible to influence students' achievement goals and engagement patterns through the environment, the effect should not be expected to be identical on all students (Barron & Harackiewicz, 2001). Even the optimal pedagogical interventions may turn out to be highly demanding for students with weak motivational resources or means for schooling, and which, without sufficient teacher guidance, could lead to avoidance behaviour (Veermans, 2004). It seems that pedagogical interventions tend to ignore differences in students' existing motivational tendencies and in their learning history, which may have revealed an association between challenging situations and feelings of frustration and failure. As Ford and Nichols (1991) state:

> *″In short, it is probably commonplace for the interventionists to think they are creating one kind of experience when in fact something else is happening. – – Without some kind of goal assessment it may be difficult for interventionists to recognize and deal with discrepancies between the intended and actual outcomes of their interventions.″* (Ford & Nichols, 1991, p. 66)

1.3.2 Task characteristics and situational interest

Most research on achievement goals considers the impact of the environment from a rather general, classroom-level perspective, while much less attention is paid to certain specific task characteristics. However, already the early theorists, such as Dweck and Nicholls, postulated that one of the critical characteristics likely to elicit different response patterns was the challenge or difficulty of the learning task. Ames (1992a, 1992b), in turn, considered the role of learning tasks to be part of the TARGET framework, and attempted to identify elements and ways of organizing them in the classroom that would encourage students to focus on mastery goals. In this context, the most critical features included optimal challenge, the meaningfulness and interestingness of the learning tasks, and the

extent to which they enabled students to proceed at their own pace, without being compared to other students in terms of progress. With the exception of the early studies on task choice and challenge (Elliott & Dweck, 1988; Nicholls, 1984a), there has been little empirical research on the effect of specific task characteristics on students' achievement goals, or on their interaction (see Kumar & Jagacinski, 2011, for an exception).

In contrast, the main focus of research on situational interest has been on the features of the situation or task that could catch students' attention and trigger interest, and also maintain the state throughout the learning period or a specific task. Research results show that students' interest may be spontaneously triggered, if the task or environment is perceived as including, for example, complex, novel, humorous, or surprising elements (Chen, Darst, & Pangrazi, 2001; Hidi & Baird, 1988; Palmer, 2009; Silvia, 2005, Wade, 2001). The use of computers as a learning tool appears to have had similar effects (Bergin 1999; Mitchell 1993). However, perceiving the task as meaningful and relevant, and as facilitating personal and social involvement, as well as the autonomous regulation of learning, seem necessary for the *maintenance* of situational interest (Harackiewicz et al., 2000; Mitchell, 1993; Palmer, 2009; Tsai, Kunter, Lüdtke, Trautwein, & Ryan, 2008).

The introduction of technology into classrooms is often justified in terms of its ability to motivate and engage students in meaningful learning (e.g., Jonassen, Howland, Marra, & Crismond, 2008). Computer simulations, for example, are commonly described as containing the above-mentioned interest-evoking characteristics (e.g., novelty and challenge), and as supporting the maintenance of interest in allowing active exploration with the material (Gehlbach et al., 2008; Yaman, Nerdel, & Bayrhuber, 2008). Another acknowledged advantage of simulations – compared to most paper-and-pencil tasks – is interactivity, which in the case of science simulations means the possibility to manipulate the parameters of the underlying system and receive feedback. In their study, Ronen and Eliahu (2000) concluded that ninth-grade students using a simulation program modeling electric circuits benefitted from the simulation's feedback, as it helped them to realize their misconceptions and to correct them accordingly. In effect, studies suggest that simulations may have some identifiable properties the effects of which on situational interest would generalize across most students (e.g., novelty and the use of computers). The interactivity, in turn, could also be a factor in maintaining interest. The possibility of formulating and exploring one's own hypotheses could increase interest through offering experiences of involvement, autonomy and control over one's own learning process. Most simulation programs also allow more free interaction among students than traditional classroom work, or are based on pair or group work.

Task concreteness and situational interest

Task concreteness is one of the characteristics that have been found to contribute to the arousal of students' situational interest and to their performance outcomes. In studies using reading tasks, the concreteness of the text has been found to influence the comprehensibility of the material, which in turn appears to predict its interestingness and recall (Sadoski, Goetz, & Rodriguez, 2000). The key factor in explaining interest arousal and performance outcomes seems to be the ease of reasoning that the concrete content supports, especially when there is little previous knowledge or familiarity with the content (Wade, 2001). Concrete text is likely to produce richer and more vivid mental representations that facilitate comprehension, the activation of interest and other affective reactions (Paivio, 1991). Similarly, concrete examples or analogies that refer to everyday knowledge or experiences have been found to support correct reasoning (Wilhelm & Beishuizen, 2003). Furthermore, the explicit examples or analogies included in concrete tasks could heighten interest in facilitating linkages between the content and personal experience or knowledge, thus evoking feelings of familiarity, utility value and personal meaning (Wade, 2001). Studies suggest that students' evaluations of text as concrete, rich in imagery, personally involving and interesting often co-occur (Sadoski et al., 2000), and perceiving a task or activity as holding personal utility value has been found to support the maintenance of situational interest (Hulleman, Godes, Hendricks, & Harackiewicz, 2010). Based on previous findings, it could further be argued that as a minimum level of comprehension is needed for feelings of meaningfulness and interest to arise (Wade, 2001), the same applies to the formation and maintenance of students' self-efficacy. Recent research on the interrelations between self-efficacy and interest indicates that these constructs are mutually dependent (Ainley et al., 2009; Hidi et al., 2002). Accordingly, students' self-efficacy judgments may partly mediate, or at least strengthen, the link between comprehensibility of the material and situational interest.

However, the beneficial effect of highly concrete learning material has recently been questioned in the context of mathematics and science instruction (see Brown, McNeil, & Glenberg, 2009; McNeil & Uttal, 2009), and also with regard to the design of simulation learning environments (Goldstone & Son, 2005; Son & Goldstone, 2009). Although a certain level of concreteness seems to foster initial comprehension of the modeled system, high levels of concreteness (e.g., in graphical illustrations) may decrease the likelihood that the elements will be understood as representing some abstract construct or phenomenon. If the connection between the presented model and the desired abstraction (the modeled world) is not obvious to the learner, the transfer of learning may be inhibited. The concern raised is thus not about concreteness as such, it is about the need to find an adaptive balance between the two extremes (concrete vs.

abstract), and to combine the advantages of both task formats. As one solution to the problem, the concept of *concreteness fading* has been introduced (Goldstone & Son, 2005; McNeil & Fyfe, 2012; Son & Goldstone, 2009). In practice, *concreteness fading* involves the gradual decreasing of concreteness during the learning process: concrete elements are used at the beginning of the task, after which there is a gradual shift towards more abstract representations. The rationale is to ensure initial understanding of what is being learned, and to ease the linking of the phenomenon to the students' own experiences. In order to avoid contextualization of the acquired knowledge or understanding, the level of concreteness is lowered, for example, by reducing the similarity with real-world objects and contextual details. Few studies have explored the benefits of *concreteness fading,* but the results so far suggest that, especially with regard to the transfer of learning, it produces better performance outcomes than relying solely on either concrete or abstract task elements (Goldstone & Son, 2005; McNeil & Fyfe, 2012; Son & Goldstone, 2009). However, there has been little research on the effect on students' motivational outcomes.

A word on individual differences in situational interest

The work of educators and teachers in motivating students would be easy, if the main concern was to provide a learning environment with certain predefined interest-arousing elements. Unfortunately, however, studies do not promise straightforward success for such an approach. First, it seems that students need a sufficient level of prior knowledge and self-efficacy in order to find an interest in, and become inspired by, a challenging learning task. Previous studies on the role of novelty, challenge and complexity in interest arousal, in fact, point to a non-linear mechanism, in which individual characteristics (e.g., prior knowledge) also play a role (Durik & Matarazzo, 2009; Silvia, 2003). Second, students' existing motivational resources (e.g., individual interest) influence their level of triggered situational interest, and may also moderate their reactions to the task characteristics. Durik and Harackiewicz (2007) found that the *a priori* defined *catch* and *hold* elements of a learning task worked differently for students with different levels of individual interest. Thus, although only a few empirical studies examine such interactions between the task and students' individual characteristics, the results suggest that there is also an important personal element in the formation of situational interest.

1.4 The present study

1.4.1 A summary of the theoretical framework

As mentioned earlier, the theoretical basis of this work lies in the ideas of interactionism and the goal theoretical perspective on personality and motivation. It is therefore assumed that student motivation is reflected in the types of goals the individual characteristically emphasizes and strives for. In interaction with situational demands, goals at the highest level of hierarchy are thought to energize, organize and guide coherent patterns of affect, cognition and behaviour in an achievement situation. Students appear to differ in the relative emphasis they place on different types of achievement goals, and thus have a tendency to systematically prioritize some goals over others.

It is suggested that these principles are in accordance with and can be illustrated through the cognitive-affective system theory of personality developed by Mischel and colleagues (Mischel, 2004; Mischel & Shoda 1995). The model conceives of personality in terms of the *organization and interaction* of certain cognitive-affective mental representations. Within this context, students' individual goal tendencies are understood as one form of such representations, the activation of which may further activate other cognitive-affective units in the personality system, and finally lead to patterns of thoughts, feelings and behaviour that are characteristic of the person. Thus, individuals differ, first in the easiness of activation (chronic accessibility) of certain units – such as personal goal tendencies – and second, in the distinctive organization of associations between these units. However, as the activation of certain units depends on the psychological meaning of the situation to the person, the role of the situation is inherent in this conceptualization of personality (Mischel, 2004; Mischel & Shoda, 1995).

Figure 1 (adapted from Mischel & Shoda, 1995) depicts the theoretical model of the hypothesized personality system. It should be noted that this model worked primarily as a conceptual and interpretative framework for the sub-studies of this thesis on the *theoretical level*. It illustrates the assumed nature of the interrelations between the constructs and the conceptualizations adopted, although the dynamic and process-oriented quality of the system cannot be verified on the *empirical level*. Consequently, the role of the model here is to provide the heuristics for understanding motivational constructs (e.g., high-order goals) within the complex personality system. It is stated that individual's personal goal tendencies work as an important part of the person's network of representations and, in interaction with the other units (e.g., individual interest), affect the way he or she selects, encodes and processes situational information (e.g., characteristics of the environment or task). Consequently, the subsequent reactions (e.g., situational interest and self-efficacy, and their interaction)

depend both on the situational features and on the organization of the activated cognitive-affective network.

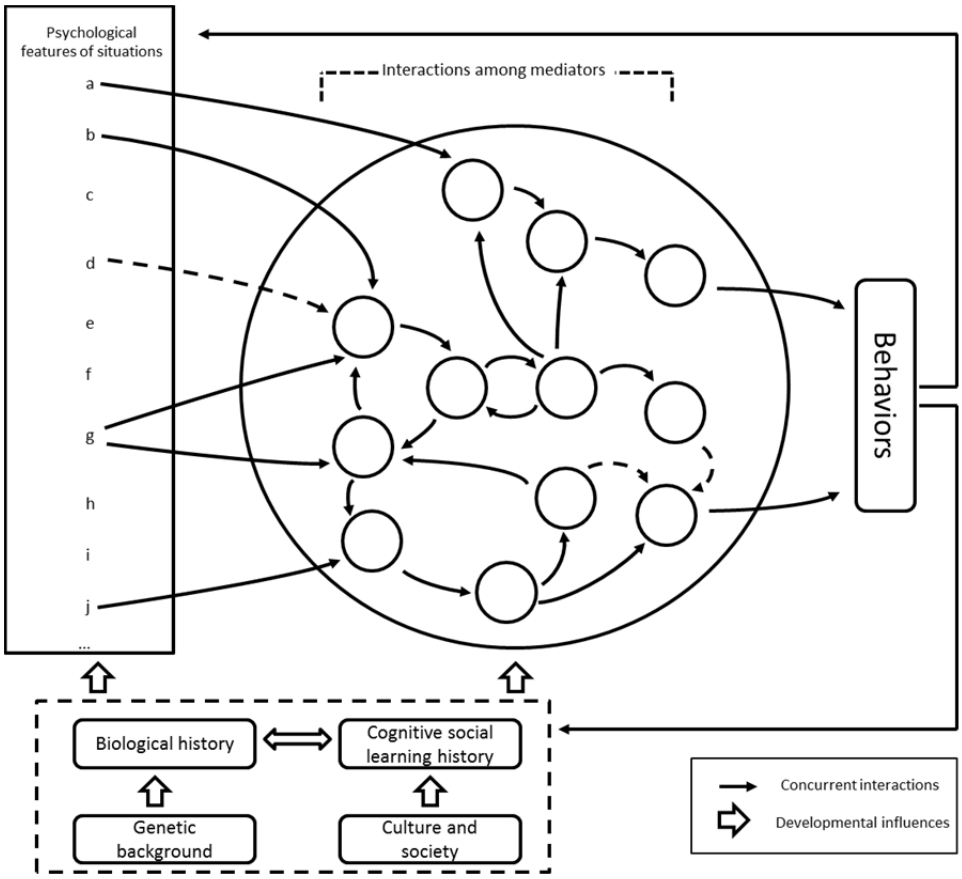

Figure 1. The Cognitive-Affective Personality System (CAPS). (Adapted from Mischel & Shoda, 1995, p. 254, 262).*)

*) *"Situational features are encoded by a given mediating unit, which activates specific subsets of other mediating units, generating distinctive cognition, affect, and behavior in response to different situations. Mediating units become activated in relation to some situational features, deactivated (inhibited) in relation to others, and are unaffected by the rest. The activated mediating units affect other mediating units through a stable network of relations that characterize an individual. The relation may be positive (solid line), which increases the activation, or negative (dashed line), which decreases the activation."* (Mischel & Shoda, 1995, p. 254)

1.4.2 The key constructs

In this work, students' higher-order achievement goals refer to the *purposes* for which they engage in a certain type of behaviour, and the term *achievement goal orientation* refers to individual proneness to emphasize and select certain types of achievement goals over others (Nicholls, 1989; Niemivirta, 2002). Complementing the already well-established performance-approach and performance-avoidance goal orientation dimensions, work-avoidance goal orientation is included in the studies in acknowledgement of students' avoidance tendencies in the classroom. Excluding this goal orientation would restrict the understanding of students' situational reactions. Moreover, students' strivings for mastery are defined through two dimensions that appear to reflect distinguishable criteria (intrinsic vs. extrinsic) and standards (relative vs. absolute) used to judge success and the attainment of mastery (Niemivirta, 2002, 2004).[4] A mastery-intrinsic orientation corresponds to the traditional definition of mastery goals (Dweck & Elliott, 1983), according to which the criteria and judgments related to learning derive from students' own evaluations and self-set standards. The need to incorporate the mastery-extrinsic goal orientation arose from the insights that mastery could also be considered in terms of absolute success (i.e., the highest possible performance outcome), the attainment of which is dependent on some extrinsic criteria (e.g., grades or test results). Although emphasizing excellent performance, it differs from the performance-approach orientation in the lack of a need for normative comparison: the focus is not on how others succeed but on how close one gets to the absolute standard. Grant and Dweck (2003) refer to similar goals as *outcome-goals*, but the term mastery-extrinsic orientation (Niemivirta, 2004) is used in this work. The concept is associated with several adaptive educational outcomes (e.g., schoolwork engagement, school value and achievement), while it has also been found to relate to maladaptive emotional consequences (e.g., stress and exhaustion, Tuominen-Soini et al., 2008, 2012). It would thus seem that students endorsing this orientation may be sensitive to performance concerns and vulnerable to emotional strain.

As noted, students' individual tendency to pursue particular types of goals seems to influence their perceptions of and reactions in an achievement situation. However, in line with the multiple goals perspective and the person-oriented approach to analysing specific goal patterns, it is also necessary to acknowledge and understand how students with different *goal profiles* react in learning and performance situations. I argue that the examination of motivational dynamics (e.g., the formation of motivational states) in a given

[4] However, Study I relies on the trichotomous goal orientation framework put forward by Nicholls and colleagues (Nicholls, 1989; Nicholls, Patashnick, & Nolen, 1985).

situation as a function of varying goal configurations offers a deeper and more multifaceted understanding of the interplay between the person and the context than the variable-centred approach. Therefore, with regard to students' goal orientations, the person-centred approach is adopted in the sub-studies in which the data is suitable for such analysis.

Individual interest is another key motivational construct that is considered important in terms of the energy with which the student approaches certain learning or performance situations and tasks. It is referred to as a relatively stable affective relation to, and a tendency to re-engage with a certain subject content (Renninger et al., 2002; Schiefele, 2009), and together with prior knowledge is assumed to influence students' motivational states. Individual interest is also expected to be related to achievement goal orientations, most probably through reciprocal cycles, but the causal ordering of the constructs is not addressed in the present studies.

Among the situation-specific motivational constructs, self-efficacy (i.e., judgment about one's ability to execute the actions required to produce certain outcomes) and situational interest (i.e., an affective state that arises in interaction between the person and the context) have found to predict student performance, but are also considered as educational outcomes in themselves. Feelings of competence and interest are sources of emotional well-being and are believed to support subsequent encounters with similar task contents. It is assumed here that these constructs are interrelated.

The context in which the motivational constructs discussed above are examined in the sub-studies varies. Study I investigates students' achievement goal orientations and goal orientation profiles in relation to their perceptions of the general classroom environment. The context in Studies II, III and IV is defined in terms of the learning task the students are working with, in other words computer-based simulations in authentic classroom situations. The use of two different task conditions for student engagement in Studies III and IV further clarifies the role of the context. The focus in all the studies is on the interdependent relations between different motivational constructs and situational characteristics. These relations also represent different, although inevitably restricted and relatively static, aspects of the theoretical assumptions illustrated in Figure 1. Interaction between the student and the environment is highlighted throughout the studies. One of the arguments in this thesis is that such a perspective has not received enough attention in the motivation research, even though on the theoretical level, it has featured in the literature for a long time. Studies II, III and IV also take account of the dynamic and evolving nature of motivational states in the measurement techniques.

1.4.3 Aims

In highlighting the reciprocal relation between the person and the situation and the evolvement of motivational states, the studies provide new perspectives on the dynamics of student motivation in the learning context at the elementary-school level. It is argued that acknowledgement of the person–context interaction is a prerequisite for understanding students' situational interpretations and reactions. Furthermore, it is not sufficient to identify distinctive associations between a set of static measures. The aim is therefore to give a more comprehensive picture of the possible interactions between individual and task characteristics and their effects on the *evolvement* of motivational states. Not all of these aspects are covered in each of the sub-studies, but in combination, the four studies constitute a coherent approach to the phenomena, and thus complement each other in a meaningful way.

Consequently, the overall aim of this thesis is to examine the dynamics of student motivation as a function of student and task characteristics. This aim is pursued under the following five research questions:

1. What is the role of motivational tendencies in situational interpretations and motivational states (Studies I, III, & IV)?
2. How do motivational states evolve and interact during a learning task (Studies II, III, & IV)?
3. How do student and task characteristics contribute to motivational states (Studies II, III, & IV)?
4. How do student and task characteristics interact during a learning task (Study IV)?
5. How do student and task characteristics and motivational states predict learning outcomes (Studies II, III, and IV)?

Table 1 summarizes the more specific aims of each study and the methods used.

Table 1. A summary of the aims, participants, measures and analyses in the respective studies.

	Main aims	Participants	Measures	Analyses
Study I	To examine students' perceptions of and preferences for the classroom environment as a function of their achievement goal orientation profiles.	208 sixth-graders	• Achievement goal orientations: learning, performance, avoidance • self-esteem, causality beliefs, academic withdrawal • Classroom perceptions and preferences	• CFA • EFA • ICC • LCCA • ANOVAs
Study II	To examine the interdependence of changes in self-efficacy and situational interest during a problem-solving task. To examine whether the changes independently predict task performance.	100 ninth-graders	• prior mathematics achievement • self-efficacy • situational interest • 3 measures during the task	• LGCMs
Study III	To examine the level of and changes in situational interest during a learning task as a function of the task characteristics. To examine the predictive effects of student and task characteristics on situational interest and their influence on the learning outcome.	57 fifth- and sixth-graders	• Achievement goal orientations: mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance, work-avoidance • subject-specific interest in mathematics • prior knowledge • situational interest • 3 measures during the task • post-task performance	• PLS path modeling • repeated-measures ANCOVA
Study IV	To examine the level of and changes in situational interest during a learning task as a function of students' motivational tendencies and the task characteristics.	140 fourth-, fifth-, and sixth-graders	• Achievement goal orientations: mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance, work-avoidance • subject-specific interest in physics • pre-test on the topic • situational interest • 3 measures during the task • post-test on the topic	• CFA • LCCA • ANOVAs • repeated-measures ANCOVA

Note. CFA = Confirmatory Factor Analysis, EFA = Exploratory Factor Analysis, ICC = Intraclass Correlation Coefficient, LCCA = Latent Class Cluster Analysis, ANOVA = Analysis of Variance, LGCM = Latent Growth Curve Model, PLS = Partial Least Squares -modeling, ANCOVA = Analysis of Covariance

2 AN OVERVIEW OF THE ORIGINAL STUDIES

2.1 Study I[5]

2.1.1 Aims

The purpose of Study I was to examine the relationship between the personal achievement goal orientations of sixth-grade students, and their perceptions and preferences related to the classroom environment. Groups of students with similar achievement goal orientation profiles were therefore identified, and the differences in classroom perceptions and preferences were examined across the groups. Various other motivational beliefs were measured and compared across the groups for validation purposes.

2.1.2 Participants and procedure

The participants were 208 sixth-graders (107 boys and 101 girls) from four elementary schools (six classes) in southern Finland, ranging in age from 12 to 13 years. During one classroom session, the students filled in a self-report questionnaire that included subscales for goal orientations, global self-esteem, causality beliefs, academic withdrawal, and perceptions and preferences related to the learning environment.

2.1.3 Measures

Achievement goal orientations

In line with the framework introduced by Nicholls and his colleagues (Nicholls, 1989; Nicholls et al., 1985), three types of individual achievement goal orientations were identified. The items on the learning orientation scale focused on mastery and acquiring new knowledge (e.g., ″The most important goal for me in school is to acquire new knowledge″). The performance orientation scale included items reflecting the aim to perform better than others (e.g., ″I am particularly satisfied when I do better in school than others″), and the avoidance orientation scale comprised items assessing the desire to minimize effort and work load (e.g., ″I try to do my schoolwork with as little effort as possible″). All the scales comprised five items rated on a seven-point *Likert*-scale ranging from 1 (*I totally disagree*) to 7 (*I totally agree*).

[5] Although Study I was published later than Study II, its implementation preceded that of Study II. The presentation of the studies follows this order.

Other motivational scales

Self-esteem was measured on five items describing an individual's overall attitude towards him or herself ("I am altogether quite satisfied with the way I am"). C*ausality beliefs* assessed students' conceptions of the causal power of certain means of achieving academic outcomes comprised three sub-scales related to effort (four items, e.g., "You learn in school, if you try enough"), ability (four items, e.g., "If you don't learn, it is because you are not smart enough"), and luck (three items, e.g., "If you do well in school, it is because you are lucky"). A*cademic withdrawal* reflected the generalized tendency to give up in demanding achievement situations, and was measured on four items (e.g., "If I have a difficult task before me, I often notice that I do not really even try"). All the items were rated on a seven-point *Likert*-scale ranging from 1 (*I totally disagree*) to 7 (*I totally agree*).

Classroom perceptions and preferences

The questionnaire assessing students' perceptions of and preferences for their classroom environment comprised 53 items focusing on the prevalence and importance of certain instructional practices and teacher behaviour. The items were based on a literature review and the TARGET framework (Ames, 1992b). In other words, the classroom structure was described in items reflecting the Task (e.g., "The teacher helps me with difficult tasks"), Authority (e.g., "The teacher gives orders about what one should do during the lessons"), Recognition ("When the teacher praises the students, she or he really means it"), Grouping (e.g., "Students are allowed to work in groups during the lessons"), Evaluation ("Students compete against each other for grades") and Time (e.g., "Students are allowed to work at their own pace during the lessons"). The items were rated on a seven-point Likert-scale ranging from 1 (*Totally disagree*) to 7 (*Totally agree*) for preferences, and 1 (*Very rarely*) to 7 (*Almost always*) for perceptions.

2.1.4 Analyses

The structural validity of the motivational variables was evaluated by means of confirmatory factor analysis. Principal axis factor analysis (with oblique rotation) was used for the dimensions of preferred and perceived learning environments. Intra-class correlation coefficients (ICCs) were computed for perceptions and preferences in order to evaluate their homogeneity in relation to the between-class variation. Following the person-centred approach, the students were classified in accordance with their scores on the achievement goal orientation scales by means of a model-based latent class cluster analysis (LCCA). Finally, analyses of variance (ANOVAs) were used to examine the group differences in the students' responses.

2.1.5 Results

The confirmatory factor analysis supported the structural validity of the motivational constructs. In the exploratory factor analysis on students' classroom preferences, a six-factor solution was chosen. However, due to vague content and low item loadings, the sixth factor was excluded from further analyses. Corresponding composite score scales based on the five remaining factors were constructed for both preferences and perceptions, and labelled: *emphasis on learning* (I)*, emphasis on ability and evaluation* (II)*, emphasis on autonomy and choice* (III)*, emphasis on individualistic work* (IV), and *emphasis on task variety* (V). According to the LCCA, a four-cluster solution fitted the data best. In line with the relative emphasis of the goal orientation scales within and between the groups, they were labelled thus: learning-oriented (*N* = 55), achievement-oriented (N = 52), performance-oriented (N = 77) and avoidance-oriented (N = 21). As expected, the differences between the groups in other motivational variables were meaningful: according to the ICCs, students' perceptions of and preferences for the classroom practices *within* the classes were relatively heterogeneous. Also as expected, students with different goal orientation profiles differed in both perceptions and preferences. For example, learning- and achievement-oriented students achieved higher scores for perceptions on the *emphasis on learning* scale, whereas the performance- and avoidance-oriented scored lowest on *emphasis on task variety*. Similarly, the group differences in classroom preferences were compatible with the students' goal orientation profiles: the achievement- and performance-oriented tended to prefer classroom *emphasis on ability and evaluation* more strongly than the other students, whereas avoidance-oriented students attached the least importance to an *emphasis on individualistic work and task variety*.

2.1.6 Discussion

The purpose of this study was to examine the role of students' individual motivational goal tendencies in their perceptions of and preferences for the learning environment. In line with theoretical assumptions on the person–context relation, achievement goal orientation was defined as an individual difference factor with which students enter the classroom. As expected, students with different motivational profiles differed in both their perceptions of and their preferences for certain aspects of their classroom environment.

Four groups of students with different goal orientation profiles were identified. The group differences in the other motivational variables were also meaningful and corresponded with previous findings. The motivational profiles of the learning- and achievement-oriented students were the most adaptive in terms of learning: these students had high self-esteem and they emphasized the

role of effort as a means for success. Performance-oriented students reported weaker self-esteem and a relatively strong belief in their ability as a cause of achievement, whereas the avoidance-oriented seemed to place the least value on academic strivings, which was also reflected in their relatively high self-reported proneness to academic withdrawal. Given their apparently varying motivational mind-sets, it is not surprising that the students differed in their perceptions and preferences with regard to the classroom environment. According to the results, learning- and achievement-oriented were more likely than other students to perceive classroom situations in positive terms: in their experience, the classroom gave more opportunities for self-improvement as well as for active participation and choice-making. Students with different motivational profiles also differed in the importance they attached to certain classroom practices. For example, performance- oriented students were more likely than others to prefer competition and public evaluation, whereas the avoidance-oriented placed the least importance on independent work and challenging tasks.

Taken together, despite the limitation of the study not being based on longitudinal data, the results suggest that students' motivational tendencies guide the interpretation of environmental cues. There is thus a need for a deeper understanding about the role of motivational characteristics in the formation of classroom experiences, and the practical implications based on them.

2.2 Study II

2.2.1 Aims

The purpose of Study II was to examine the relationship between changes in self-efficacy and in situational interest during a problem-solving task. A further aim was to find out whether the changes independently and jointly predicted overall task performance.

2.2.2 Participants and procedure

The participants were 100 ninth-graders (53 girls and 47 boys) from four different schools in southern Finland. The students were between 15 and 16 years of age. The students worked individually on a complex simulation-based problem-solving task during a small-group session in the school's computer classroom. The program was an interactive computer simulation called "The MED-LAB", which entails complex problem solving. For the purposes of the study, the participants were asked to explore a dynamic system of structural equations during three exploration rounds, and to infer from their exploration the underlying causal system between the variables. They rated their self-efficacy judgments and interest three times during the working period.

2.2.3 Measures

Self-Efficacy and Interest

The students rated their self-efficacy and situational interest after each exploration round. Self-efficacy was assessed on two seven-point Likert-scaled (1 = Not true at all – 7 = Very true) items (e.g., ″I will most certainly do well in this task″), and interest on three similarly scaled items (e.g., ″This task appears to be very interesting″). High normative stability across the measurement points was found for both constructs.

Task Performance

The performance-outcome score was based on the students' drawings of the relationships between the system variables. The total score comprised the number of correct links between inputs and outputs, correct directions (positive or negative effect), correct weights and correct markings. Only the total score, ranging from 0 to 16, was used for the purposes of this study. The score mean was 11.77 (*SD* = 4.60).

Covariates

The students' previous (8th grade) mathematics grades (*M* = 7.90, *SD* = 1.22, range = 4–10) were used as a covariate in the analyses of change, in order to control for the effects of mathematical competence on the measured constructs.

2.2.4 Analyses

Latent growth curve models (LGCMs) within the structural equation modeling framework were used in the analyses of change over time. The analyses were carried out in four steps: first, univariate LGCMs were estimated for self-efficacy and interest; second, a bivariate LGCM was estimated to examine how the parameters of change for both constructs related to each other; third, the bivariate model was extended by including a covariate; and fourth, a full model with a predictor and a distal outcome was estimated. M*plus* statistical software (Muthen & Muthen, 1998–2006) was used for all the analyses.

2.2.5 Results

The univariate and bivariate growth models

The first step in the analysis was to describe the characteristics of the individual differences in the growth trajectories of the students' task-specific self-efficacy and interest. This entailed estimating an unconditional growth model for each

construct. Thus, in both models, two latent factors represented the intercept (initial level) and the slope of the growth trajectory. The estimated unconditional growth model for self-efficacy fitted the data well: the mean and the variance of the initial level were significant, as were the mean and variance of the slope. These results indicated a significant overall positive change in self-efficacy during the task, and significant individual differences in both the initial level and the slope. The model for interest also fitted the data: the parameters of change showed no overall change in interest, but there was significant variability in both the initial level and the slope. The next step was to find out whether the level and change in both self-efficacy and interest were related. This was done via a bivariate latent growth model, which allows the estimation of correlations between initial levels and slopes. The fit of this model was good. The significant positive correlations between the initial levels and the slopes of both constructs indicated an association between the levels of self-efficacy and interest at the beginning of the task, as well as between the rates of change during the task.

The bivariate growth model with a predictor

The third step extended the previous model by introducing an independent predictor, prior mathematics grades. Thus, the observed variability in the initial levels and slopes of self-efficacy and interest was modeled by regressing them on an exogenous variable. The conditional model was estimated and found to fit the data well. An examination of the regression coefficients indicated that mathematics grades predicted the initial levels of both self-efficacy and interest, but there were no effects on the slope parameters.

The full model with a predictor and an outcome

An outcome was incorporated into the model in the final stage of the analyses. Task performance was regressed on both the covariate (mathematics grades) and the parameters of change (initial levels and slopes of self-efficacy and interest). Thus, by taking into account the differences in prior achievement in mathematics, we were able to estimate the independent effects of the level and change in self-efficacy and interest on task performance. In order to obtain more detailed information about the unique and joint effects, we first estimated separate full models for both constructs. The model for self-efficacy fitted the data well. An examination of the regression coefficients showed that prior mathematics grades and the initial level of self-efficacy predicted task performance. A similar model for interest also fitted the data, and according to the regression coefficients, in addition to mathematics grades, initial interest also influenced final task performance. The final full model incorporating both self-efficacy and interest also fitted the data well, but showed a somewhat

different pattern of effects. Following adjustment for the mutual effects of self-efficacy and interest, task performance turned out to be predicted by mathematics grades, the initial level of self-efficacy, and the rate of change in interest. These factors accounted for 46 per cent of the variance in task performance.

2.2.6 Discussion

The aim of Study II was to examine the initial levels of and changes in self-efficacy and situational interest, and their mutual relationship, during engagement in a challenging problem-solving task. The corresponding unique and joint roles in the students' task performance were also investigated, with their prior achievement in mathematics as a control variable. The results revealed individual differences in the initial levels of self-efficacy and interest at the beginning of the task. Moreover, self-efficacy in general became stronger as the students proceeded with the task. Thus, making progress in the task through successful exploration was likely to reinforce their efficacy evaluations. The results also revealed individual differences in the rate of change in both constructs: whereas some students experienced an increase in self-efficacy and interest during the task, for others there was a decrease or no change. However, the identified changes in these constructs were interdependent: a *change* (i.e., increase or decrease) in one construct resulted in a *parallel change* in the other.

Regarding the role of prior achievement, mathematics grades predicted the initial levels of self-efficacy and interest, whereas any changes during the task were independent of these grades. Consequently, competence in the domain of the task may be crucial, especially as far as initial responses and self-evaluations are concerned, whereas subsequent reactions are, to a large extent, formed in interaction with the task characteristics. This result is relevant with regard to the predictors of students' task performance: when estimated jointly, the level of initial self-efficacy and the degree of change in interest predicted the final outcome. Thus, over and above their prevailing abilities, students' subjective estimation of and belief in their capacity to produce certain outcomes influence their performance. Moreover, the results indicate that it may be the positive *change* in situational interest that matters in terms of performance. However, the results of the study give no information about the mechanism underlying this process, or about the causal order of the observed changes in self-efficacy and interest; therefore future research should address these issues.

2.3 Study III[6]

2.3.1 Aims

The first aim of Study III was to examine the level of and change in situational interest among fifth- and sixth-grade students as a function of task characteristics. The second aim was to investigate the predictive relationships between student characteristics, task conditions, situational interest and post-task performance. In order to assess the influence of task characteristics, two different task conditions were created based on different versions of a computer-based science simulation. The difference between the two versions was in the level of concreteness of the simulation elements.

2.3.2 Participants and procedure

The participants of the study were 57 students (33 girls and 24 boys) from three elementary classes in south-western Finland. The students were fifth- and sixth-graders aged 11 to 12 years. Due to incomplete data, the final sample consisted of 52 students. The participating classes agreed to study and explore the basics of electric circuits using a computer-based simulation program during one 90-minute learning session. The students were randomly assigned to one of two different task conditions based on their scores on a test of prior knowledge, and accordingly worked with two different versions of the simulation. In one version, the simulation elements remained concrete throughout the task (labelled the *concrete* version), whereas in the other (labelled the *concreteness fading* version), the elements switched from concrete to abstract during the experimentation phase. The main difference between the conditions was that in the former, the students constructed all the circuits with bulbs, whereas in the latter, they constructed the majority of the circuits with resistors.

The data was collected in three separate sessions. A couple of days before the learning task, the students completed a self-report questionnaire concerning their personal achievement goal orientations and subject-specific interest in certain school subjects. Immediately after completing the questionnaire, they were given a test measuring prior knowledge about the principles of electric circuits. They were then assigned to either the *concrete* (n = 26) or *concreteness fading* (n = 26) task conditions. The students worked on the simulation in pairs in the school's computer classroom. The paper-and-pencil worksheets included instructions and assignments related to the simulation. Although working in pairs, the students filled in their own worksheets. Post-task performance was measured one day after the simulation task.

[6] The study was conducted within the COSILAB project (Academy of Finland, grant nr: 252580).

2.3.3 Measures

Achievement goal orientations

Achievement goal orientations were assessed on an instrument (Niemivirta, 2002) that differentiates five types of personal goal orientations. The items on the mastery-intrinsic scale concern the desire to learn new things and acquire knowledge according to self-set standards (e.g., "To acquire new knowledge is an important goal for me in school"), whereas the mastery-extrinsic scale assesses the student's emphasis on mastery and success according to absolute (but extrinsic) standards (e.g., "My goal is to get good grades"). The scale for a performance-approach orientation reflects the desire to perform better than other students (e.g., "An important goal for me in school is to do better than other students"), whereas the performance-avoidance scale comprises items assessing the aim to avoid public failure (e.g., "I try to avoid situations in which I might fail or make mistakes"). The work-avoidance orientation scale consists of items assessing the extent of concern about minimizing effort and avoiding work in achievement situations (e.g., "I try to do my schoolwork with as little effort as possible"). Each orientation scale included three items rated on a seven-point *Likert*-scale ranging from 1 (*not true at all*) to 7 (*very true*).

Prior knowledge

The test of prior knowledge included two tasks consisting of several items. The students were asked to reason out and compare the voltage of bulbs in different circuits. One point was given for each correct answer. An average composite score ($\alpha = .77$) was created for the descriptive and correlational analyses.

Subject-specific individual interest

The simulation included some basic calculations requiring the utilization of mathematical reasoning, thus mathematics was considered a relevant school subject[7] in this context. The students were therefore asked to rate how interested they were in mathematics on a single scale, with five face icons representing a response continuum from 1 *(not at all interested*) to 5 (*very interested*).

[7] At the time of the data collection the fifth-graders had not yet studied physics as a separate school subject (in Finland, Environmental and Natural Sciences covers physics instruction until the 5th grade). An attempt was made to assess interest in physics with reference to this subject. However, this item turned out to be overly confusing to the students, and was therefore excluded from the further analyses.

Situational interest

Situational interest was assessed on one item during the simulation in three different phases of the working period. The format of the scale was similar to the measure of subject-specific interest: the students were presented with the statement, "I find working on these tasks..." and asked to mark one face icon on a continuum ranging from *not at all interesting* (coded as 1) to *very interesting* (coded as 5). After being given the general instructions, the students filled in the first worksheet with the researcher who was guiding the session. The first item was presented on the reverse side of the rehearsal worksheet, and the subsequent items were inserted after worksheets 4 and 7.

Post-task performance

A test consisting of the same two tasks as the test of prior knowledge was used to measure post-task performance. An average composite score of the items (α = .87) was created for the descriptive and correlational analyses.

2.3.4 Analyses

The next step was to examine the level of and change in situational interest in the groups using the two simulation versions. Therefore, we conducted a repeated measures analysis of covariance on the situational interest measures, with gender, prior knowledge, interest in mathematics and achievement goal orientations as covariates. We used partial least squares (PLS) path modeling (Chin, 1998) to test for predictive effects between the variables. The specification of the model was based on our theoretical assumptions. With regard to the predictive relationships, the observed measure of interest in mathematics was set to predict prior knowledge, and both these factors were regressed on the five achievement goal orientations. The successive measures of situational interest were regressed on the achievement goal orientations, interest in mathematics, prior knowledge and the observed measure of the task condition. These factors, in turn, were set to predict the students' post-task performance.

2.3.5 Results

In terms of the level of and change in situational interest as a function of task concreteness, the results showed a significant interaction effect of the task condition and situational interest. Thus, situational interest evolved differently over time in the two conditions: there was an increase in the level of interest among students assigned to the *concrete* condition, and a decrease among those in the *concreteness fading* group. Of the covariates, only interest in mathematics showed a marginally significant effect on the change in situational interest over

time. There was also a between-subjects effect for gender, showing that, on average, the boys' (n = 20) ratings remained higher than those of the girls (n = 32) throughout the task.

Our model on the predictive effects showed that mastery-intrinsic and work-avoidance orientations were the strongest predictors of interest in mathematics. Student and task characteristics together explained 21 % of the variance in situational interest at the beginning of the task, but interest in mathematics was the only significant predictor. The situational interest measures were mutually predictive, indicating stability in the sequential ratings. Neither interest in mathematics nor situational interest during the task predicted post-task performance, but as expected, prior knowledge did. The effect of the task condition on post-task performance was also significant, showing that students assigned to the *concrete* condition outperformed those in the *concreteness fading* group. All in all, the model explained 39 % of the variance in post-task performance.

2.3.6 Discussion

The first objective of Study III was to examine the level of and change in situational interest among students working under two different types of task conditions. To reach this aim, two versions of a simulation program with varying levels of concreteness were used. It was expected that in the more concrete task condition the level of students' situational interest would be higher. The second objective was to assess the predictive effects of individual characteristics and task concreteness on both situational interest and post-task performance.

The changes in situational interest varied according to the task condition. On average, students working on the more concrete version maintained their interest throughout the task, whereas those in the *concreteness fading* group experienced a drop from their aroused level of situational interest. Thus, our assumption was partly supported: the direction of change varied, being more beneficial under the *concrete* condition. In other words, the more concrete version was more likely to maintain and enhance situational interest during the task. The fact that the boys maintained a higher level of interest than the girls throughout the task was in accordance with the results of previous research.

With regard to the predictive effects of the model, it turned out that 1) students' motivational tendencies contributed to the arousal of situational interest at the beginning of the task, 2) situational interest measures showed high stability throughout the task, and 3) prior knowledge and the task condition predicted the learning outcome. Thus there was support for some of the expected relations, but not all. The relevance of students' goal orientations and subject-specific interest to the arousal of situational interest was demonstrated: a mastery focus and interest in the subject domain seem to facilitate connection

with the learning task. The results also suggest that once a positive connection has been formed, it is likely to be maintained. Although the predictive effect of situational interest on performance was not significant, there were indications that a positive *change* in interest could be related to better performance outcomes.

In sum, the results of this study illustrate the relevance of examining both the individual characteristics of the students and the features of the task, in order to account for the arousal and development of motivational states. Consequently, its main contribution was to examine the joint effect of both of these factors on the development of situational interest during a learning period. Future studies should consider these dynamic micro-level processes in relation to the development of more stable individual motivational tendencies (e.g., the development of individual interest). The main shortcomings of the study also indicate the need for future research. Given the small sample size, there is a need to replicate the complex relationships identified in the empirical model. Furthermore, experimental conditions with more salient task differences might result in stronger predictive effects.

2.4 Study IV[8]

2.4.1 Aims

The aim of Study IV was to examine the arousal and evolvement of students' situational interest during a simulated science learning task as a function of their motivational tendencies and the concreteness of the task. The main focus was on the interaction between achievement goal orientations and task concreteness, and its effect on the level of and changes in situational interest. As in Study III, the two versions (i.e., *concrete* and *concreteness fading*) of the simulation program used differed in the degree of concreteness of the elements illustrating the basic functions of electric circuits.

2.4.2 Participants and procedure

The participants were 140 elementary-school students (69 girls and 71 boys) from grades four, five and six (aged 10 to 12 years), of whom 136 were present at the simulation session. The participating schools were all situated in south-western Finland. Most of the students had limited knowledge of physics and the topic of the learning task (i.e., electricity). The simulation program was the same as in Study III, and the experimental task conditions were similar. Also as in

[8] The experiment was conducted within the COSILAB project framework funded by the Academy of Finland (grant no 252580).

Study III, students were randomly assigned to the *concrete (n = 68)* and *concreteness fading* (n = 68) groups based on their pre-test scores. The data collection was also identical to the procedure followed in Study III. However, slight revisions were made to the assignment worksheets the students worked with. No changes were made to the simulation program.

2.4.3 Measures

The measured constructs were the same as in Study III. However, the scale format of subject-specific interest and situational interest was revised, as were the items in the pre- and post-tests.

Achievement goal orientations

The assessment of goal orientations was based on the instrument developed by Niemivirta (2002, see Study III). In other words, the students' personal goal orientations were assessed on mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance and work-avoidance scales, each comprising three items and rated on a seven-point Likert-scale ranging from 1 (*not true at all*) to 7 (*very true*).

Subject-specific individual interest

The questionnaire measured interest in physics, the subject that was most closely connected to the topic of the simulation (electricity). The students were asked to identify their level of interest in physics on a single-item scale ranging from 1 (*not at all interested*) to 7 (*very interested*).

Pre- and post-tests

A pre-test consisting of six tasks, each comprising several items was administered to measure the students' prior knowledge of electric circuits. Diagrams representing different kinds of circuits ranged from simple concrete illustrations (mimicking real bulbs and wires) to more complex constructions and schematic drawings (e.g., circuits with several bulbs). An average composite score (α = .84) was computed for further analyses. The *post-test* included the same six items, hence, the total score served as the measure of learning outcome. Again, an average composite score (α = .92) was computed for further analyses.

Situational interest

As in Study III, students' subjective experience of situational interest was measured on one item during three different phases of the learning task. First measurement, after completing a rehearsal worksheet, the students responded to

the statement "Working on these tasks seems to be..." on a scale ranging from 1 (*not at all interesting*) to 7 (*very interesting*). The two subsequent measurements (with the wording "I find working on these tasks...") were taken following the completion of worksheets 4 and 7.

2.4.4 Analyses

Confirmatory factor analysis and *Mplus* statistics software were used to assess the structural validity of the achievement goal orientation scales. The first step was to identify groups of students with similar achievement goal orientation profiles by means of a series of model-based latent class cluster analyses (LCCA). ANOVAs were used to examine group differences in the pre-and post-test scores, interest in physics and situational interest. A repeated-measures ANCOVA with gender, pre-test performance and interest in physics as covariates assessed the main and interaction effects of the task condition and goal orientation on the changes in situational interest.

2.4.5 Results

The CFA of the achievement goal orientations supported the structural validity of the five scales. The results of a series of LCCAs showed that the three-class solution fitted the data best. The groups were labelled success-oriented (group 1, N = 58), mastery-oriented (group 2, N = 47) and avoidance-oriented (group 3, N = 33) in line with the dominant orientation type and the relative inter-group differences.

The repeated measures ANCOVA revealed the following main results. First, the quadratic goal orientation group × time interaction effect was significant, indicating that the patterns of change in situational interest depended partly on the students' goal orientation group. On average, the change was gradually increasing for the mastery-oriented and decreasing for the success-oriented students. As expected, the avoidance-oriented students maintained the lowest level of situational interest in both conditions. Second, in contrast to our expectations, the interaction effect of the task condition and situational interest over time was not significant. In other words, the changes in situational interest across the measures paralleled each other in the two task conditions. Third, as assumed, there was a significant quadratic goal orientation group × task condition × situational interest interaction. Consequently, the patterns of change in situational interest varied in the different goal orientation groups as a function of the task condition. Also as assumed, the difference between the conditions was the most apparent in the group of students placing the strongest emphasis on performance goals (i.e., success-oriented students): they showed the anticipated decrease in situational interest in the concreteness fading task

condition. Finally, given the significant main effect of gender, the boys, on average, reported higher levels of situational interest during the task than the girls.

In terms of learning outcomes, there was a significant increase in performance from pre- to post-test. This improvement was associated with the students' interest in physics, whereas neither the goal orientation group nor task concreteness predicted test performance or any change in it. The boys achieved higher performance scores, averaged across the tests, than the girls.

2.4.6 Discussion

The objective of Study IV was to examine the influence of students' achievement goal orientations and task concreteness, and the interaction effects on the change in situational interest during a science learning task. We assumed differences in motivation would result in different perceptions and interpretations of the task, further influencing the arousal and evolvement of situational interest.

Three groups of students with different goal orientation profiles were identified: success-, mastery- and avoidance-oriented. Even though the groups were equal in terms of pre-test performance, students came to the task situation with different levels of individual interest: the avoidance-oriented had the lowest level of interest in physics as a school subject. We found that the changes in situational interest were partly dependent on the goal orientation group. However, the patterns of change were somewhat more evident in the more abstract (i.e., *concreteness fading*) condition, thus supporting our assumption of an interaction between the goal orientation group and the task condition. In line with our expectations, the level of situational interest among the mastery-oriented students was either held constant (*concrete* condition) or slightly increased (*concreteness fading* condition) during the task. Situational interest was lowest among the avoidance-oriented students, although relatively stable in both conditions. Also as expected, the pattern of change among the success-oriented students differed according to the conditions: the trend was more clearly downward in the *concreteness fading* condition than in the *concrete* condition. Consequently, in terms of changes in situational interest, both mastery- and avoidance-oriented students seemed to be less influenced by the different task conditions than the success-oriented.

The intelligibility of the results could be discussed in terms of each group's predominant goals and characteristic engagement patterns. For mastery-focused students, the reward is inherent in the activity, and situational interest is likely to be aroused even in challenging circumstances. In contrast, the formation of interest and engaging with a task is in conflict with the desire to minimize effort among the avoidance-oriented, whereas among the success-oriented the

motivational response may depend more on the conditions and the opportunities to demonstrate their success. In our study, the *concreteness fading* condition did not seem optimally to support goal attainment among the success-oriented students. With regard to the influence of the task, we did not find any strong effect for the type of simulation used. Thus, the results did not fully support our assumption of a more positive level and pattern of change in the *concrete* task condition. There were no differences in learning outcome between the task conditions either. As in Study III, it appears that the difference in the concreteness of the simulation elements between the task conditions was not clear enough to produce differences in the students' situational interest or subsequent learning.

In sum, this study showed how students' motivational tendencies and task characteristics may interact to produce different kinds of situational responses. Future studies based on carefully planned experimental designs should acknowledge the broader learning context: classroom and school evaluation practices, for example, play an important role in the way students approach and expose themselves to academic challenges.

3 GENERAL DISCUSSION

The general aim of this thesis was to enhance understanding of the dynamics of student motivation in the learning context. Motivation was considered in terms of both relatively stable individual tendencies (i.e., achievement goal orientations and individual interest) and cognitive-affective situational states (i.e., self-efficacy and situational interest). Consequently, the guiding and instigating role of motivation, as well as its manifestation in students' engagement, was acknowledged. The *dynamics* of motivation, in turn, was addressed by examining person-situation interactions, and by acknowledging the evolving nature of students' motivational states during learning. In line with the ideas of interactionism (Endler, 1983; Mischel & Shoda, 1995), the nature of the person-context relationship was assumed to be reciprocal. In the following, the results are discussed with reference to the five research questions addressed across the studies.

3.1 The main findings of the studies

3.1.1 The role of motivational tendencies in situational interpretations and motivational states

Studies I, III and IV examined students' individual motivational tendencies, and their interpretations and motivational states in learning situations. The assumption was that students' characteristic goal tendencies and individual interest influence the way they perceive situational cues and approach learning tasks. The results of the three sub-studies support this assumption. First, it was shown that students with different motivational profiles perceived certain features of their classroom environment differently. Second, their individual motivational resources, or the lack of them, influenced not only the triggering of situational interest, but also the changes in it throughout their engagement with the task. As situational interest is postulated to be formed in interplay between the student and the task features (Krapp, 2007), this result also shows how motivational tendencies shape students' interpretations: they may experience the interestingness of the task differently.

The resulting picture of the effects of motivational tendencies was based on both variable- and person-centred methodological approaches. The results were compatible, and also complementary in significant ways: they yielded information about the predictive relationships between the variables, and also shed light on their interdependence from a more person-oriented perspective that takes into account the patterns of variables within types of individuals

(Bergman & Magnusson, 1997). When the students were classified on the basis of their achievement goal orientations (Studies I and IV), similar groups of students emerged that also resembled each other in terms of the adaptiveness of the overall profiles. Moreover, the correlations between the sets of variables were highly similar across the studies.

First, the beneficial nature of a mastery goal orientation was clearly demonstrated. Students emphasizing learning goals were found to perceive their classroom environment as supportive of learning, and they also preferred it that way (Study I). They were also able to maintain their high level of situational interest throughout the learning task, and even to increase it in the more demanding task condition (Study IV). Furthermore, mastery-intrinsic goal orientation (on the variable level) was associated with subject-specific individual interest that, in turn, predicted the initial level of situational interest (Study III). Second, it is noteworthy that the group of students with a high emphasis on both mastery and performance orientations (i.e., labelled achievement-oriented in Study I and success-oriented in Study IV) equalled the mastery-oriented students in terms of positive classroom perceptions and overall level of situational interest. However, they showed a stronger preference for competitive classroom practices (Study I) and were more sensitive to task demands, as shown in the changes in situational interest during the learning task (Study IV). Third, students who primarily emphasized performance-related goals (i.e., performance-oriented, Study I) and a work-avoidance orientation (i.e., avoidance-oriented, Studies I and IV) had less positive perceptions of their classroom environment in terms of its learning focus and the availability of opportunities. Avoidance-oriented students also showed the lowest level of situational interest during the learning task. Finally, work-avoidance orientation had a marginally significant negative effect on students' subject-specific individual interest that mediated the influence of the orientations on situational interest (Study III).

Taken together, the results concerning the role of various achievement goal orientations in students' perceptions and task-specific reactions were in line with those reported in previous studies, and especially with the early theorizing (Dweck & Elliot, 1983). The fact that the students' perceptions and preferences paralleled their personal goal tendencies supported the notion that the meaning of the situational cues, on both the classroom and the task level, is construed based on one's higher-order goals (Dweck & Leggett, 1988; Nicholls, 1989). Consequently, it is possible that the students are more sensitive to the features of the environment or task that are either supportive or counterproductive in terms of their dominant goal strivings (Heckhausen & Heckhausen, 2008; Järvelä & Niemivirta, 2001).

The observed relations between achievement goal orientations and individual and situational interest were also in line with previous research (Ainley & Patrick, 2006; Hidi & Harackiewicz, 2000; Luo et al., 2011). It could be concluded that mastery-intrinsic goal orientation, together with high individual interest, activates the arousal of situational interest more easily than other goal orientation types. Thus, the results support the claim that different goal tendencies may elicit different cognitive-affective response patterns when engaging with a learning task (Dweck, 1986; Dweck & Elliott, 1983). From the perspective of the *focus and meaning* of the engagement within each goal orientation, it is possible that the reward inherent in the activity facilitates the emergence and maintenance of situational interest among students emphasizing mastery (Dewey, 1913; Nicholls, 1989). Although performance-approach orientation was also associated with the arousal of situational interest in Study IV, there were indications that even accompanied with mastery orientation, the maintenance of interest may be harder when there is a strong focus on performance. According to similar findings presented earlier, performance-related goals are associated with experiencing an increase in negative and a decrease in positive affect when the task or the feedback received does not meet students' expectations (Kumar & Jagacinski, 2011; Sideridis & Kaplan, 2011; Tulis & Ainley, 2011). Finally, the observed less adaptive response pattern related to a work-avoidance orientation could be taken to indicate difficulties in finding satisfaction and personal value in academic work in general (Nicholls, 1984a; Nicholls et al., 1985). The mind-set focused on leaving the task situation with minimal effort may hinder and restrict the activation of positive feelings, or at least require the students to override the reluctant attitude deriving from their personal characteristics.

Although there is some previous evidence of the predictive effects of achievement goal orientations on students' interest during a learning task (Ainley & Patrick, 2006), the results reported here – besides confirming the previous findings – add to this knowledge in illustrating how the *evolvement* of interest is dependent on students' goal orientation *profiles*. Both perspectives support the conclusion that the effect of achievement goal orientations does not seem to fade out in the course of the task, but continues to characterize student involvement. In terms of students' classroom perceptions and compared to previous research (e.g., Gonida et al., 2009; Greene et al., 2004), Study I offered an alternative interpretation of the observed relations between perceptions and student characteristics: focusing on person-context reciprocity, it sheds light on the meaning of students' motivational mind-set in subjective classroom experiences. In addition, the findings related to students' classroom preferences give a new perspective on the role of higher-order goals in expectations and values related to certain instructional decisions. It could be concluded that the

influence of students' preferences may also be either beneficial or counterproductive in terms of learning, in that they may guide or restrict their choices and willingness to take part in various classroom practices (Järvelä & Niemivirta, 2001).

3.1.2 The evolvement of and interplay among motivational states

Studies II, III and IV investigated the evolvement of and interaction among students' motivational states. Repeated measures of the states revealed different evolvement patterns for situational interest and self-efficacy. Although the *overall level* of situational interest turned out to be relatively stable in these studies, there was a significant increase in self-efficacy appraisals during the task in Study II. In line with findings from earlier research, the use of computers, novelty related to the task content and format, interactivity and feedback provided in the simulations seemed to support the maintenance of a relatively high level of motivational states (Mitchell, 1993; Schraw & Lehman, 2001). There are still relatively few studies examining the change in self-efficacy and situational interest throughout a learning task, but the results suggest that the overall trend depends on the type and characteristics of the task (Ainley et al., 2009; Graham et al., 2008; Palmer, 2009; Rotgans & Schmidt, 2011; Wu, Lowyck, Sercu, & Elen, 2012). This is not surprising, taking into account the relational nature of the constructs: the states are meaningfully interpreted only in relation to the task itself. However, a common finding across different types of tasks – also illustrated in our studies – seems to be a relatively high (rank-order) stability in students' successive motivational states (Ainley et al., 2009; Graham et al., 2008; Rotgans & Schmidt, 2011). Consequently, the initial motivational state elicited at the onset of a learning task also seems to characterize later engagement.

With regard to the interplay between simultaneous motivational states, it is possible that the *pattern of interaction* also depends, to some extent, on the specific features of the task (e.g., difficulty, see Ainley et al., 2009). Nevertheless, the results of Study II support previous findings on the interrelation between students' self-efficacy and interest experiences (Bandura & Schunk, 1981; Hidi et al., 2002; Silvia, 2003). Furthermore, the present findings offer new insights into the *interdependence of changes* in them. The observed parallel changes suggested that the positive reactions or experiences boosted each other, whereas the decrease in one of the constructs resulted in a concurrent decrement in the other. Although the results do not explain the mechanism, it is likely that the simultaneous and successive processes of persistence, mastery experiences and positive emotions facilitate the mutual activation. In contrast, experiences of frustration and negative emotions following unsuccessful trials with the task may mediate the more counterproductive relationship.

3.1.3 The contributions of student and task characteristics to motivational states

The three studies on task-specific measures also revealed that "there is more to it than meets the eye" in terms of the overall level of students' motivational states. The *role of the task characteristics* was most clearly demonstrated in Study III, in that there was a decline in situational interest among students working on the less concrete type of simulation. Thus, on the one hand, the study replicated earlier findings on the beneficial effect of concrete (vs. abstract) learning content on situational interest (Sadoski, 2001; Wade, 2001), but on the other hand, it also demonstrated the – rarely experimentally proven – effect of the task characteristics on the change in situational interest. Accordingly, the present findings support the notion that the task features can facilitate the *maintenance* of situational interest, whereas at the same time, interest may also start to diminish if not extrinsically supported (Hidi & Harackiewicz, 2000; Hidi & Renninger, 2006).

Together the studies also showed that there was variability in both the levels of changes in situational interest and self-efficacy throughout the tasks, and in the trends. Thus, even though the task characteristics produced a certain effect on the change in the students' motivational states, the change would probably be manifested on different levels for different students. The relatively high stability of situational interest observed in Studies III and IV also supports this conclusion. In other words, the individual differences seem to hold despite the task effects.

As noted above, students' personal motivational tendencies represent one set of factors behind the individual differences in triggering and maintaining motivational states. In addition, previous findings concerning the effects of prior knowledge and gender were replicated (Ainley, Hidi et al., 2002; Alexander et al., 1995, Tsai et al., 2008). In the present research, students' prior knowledge (or prior achievement) and individual interest showed distinctive predictive effects and correlation patterns with regard to situational interest, which also varied across the studies. In the light of previous findings, both prior knowledge and individual interest could be considered beneficial, but not necessarily sufficient in themselves as factors motivating task engagement (Durik & Matarazzo, 2009). Moreover, despite the possible interaction effects, both prior knowledge and individual interest appear to influence situational interest independently of each other (Ainley, Hidi et al., 2002, Harackiewicz et al., 2008). Finally, according to the present results, their effects were highlighted on the initial level of motivational states, and to a lesser degree in their maintenance. In contrast, the influence of gender was apparent in the level of situational interest, with the boys achieving higher scores throughout the science learning tasks (Studies III and IV, see also Graham et al., 2008). In effect, it

seems that different individual factors may affect students' motivational states in different phases of task engagement. However, increasing the complexity even further, the influence of individual factors on motivational states seems to depend partly on the characteristics of the task, and vice versa.

3.1.4 The interaction effects between student and task characteristics

Although interaction between the person and the context is an issue in the results discussed above, it remains somewhat on the level of assumption, having not been tested directly. In order to address the question statistically, an appropriate comparative study design was created for Study IV. The purpose was to find out whether the theoretical notions of early achievement goal theorists (Dweck & Elliott, 1983; Dweck & Leggett, 1988; Nicholls, 1989) could be demonstrated empirically; in other words, whether students with different predominant goal orientations reacted differently to different task characteristics. To my knowledge, there are only a few studies examining such interactions.

Although not all of the assumptions were supported, the results nevertheless revealed an interaction effect between the goal orientation group and the task condition that was manifested in the evolvement of situational interest throughout the task. Thus, the task condition made a difference in terms of motivational state, depending on the students' individual goal tendencies. In other words, in terms of achievement goal theory, a tendency to favour and emphasize certain achievement goals seemed to sensitize students to certain cues in the task, and to affect their interpretations of the task, and their subsequent reactions to it.

As expected, students placing a relatively high emphasis on performance-related goals seemed to be the most sensitive to task characteristics implying challenge, or to task features that were not optimally compatible with their personal goal preferences. In contrast, mastery- and avoidance-oriented students did not seem to be as responsive to the differences inherent in the task conditions. Similar findings were reported in a study conducted by Niemivirta (2002), who identified condition-specific differences in the situational responses of students with different goal orientation profiles. Students with predominant performance or work-avoidance goals showed more detrimental motivational states than mastery-oriented students in a task condition emphasizing normative performance, whereas there were no differences between the groups in the condition emphasizing exploration and learning. Thus, these results support the view that students' situational reactions parallel their personal motivational profile, and consequently could also be understood as following on from efforts to adapt to the perceived demands of the situation (Boekaerts & Niemivirta, 2000; Dweck, 1996).

3.1.5 The effects on learning outcomes

The following observations were made concerning the effects of student and task characteristics on the performance measures used in the studies. There was an apparent beneficial influence of students' prior knowledge or competence (as indicated by pre-test scores or grades: Studies II, III & IV). Quite self-evidently, background knowledge facilitates comprehension of the learning content (Lee & Chen, 2009; Linnenbrink-Garcia, Pugh, Koskey, & Stewart, 2012), and in the three studies most likely also made it easier for the students to grasp the idea of the simulation and thus to benefit from the onset of the task. However, motivational factors also had independent effects even after controlling for prior knowledge. First, the effect of self-efficacy on performance outcomes was replicated (Multon, Brown, & Lent, 1991; Pajares & Valiante, 1999; Wu et al., 2012). Thus, irrespective of the competence level, belief and confidence in one's capabilities is a crucial factor that probably also influences the amount of effort invested in a task. Second, in two of the studies (II & III), there were indications of the beneficial effect of an *increase* in situational interest on performance. Consequently, it may be that, in addition to the level of situational interest, a *positive change* during the course of the task has a unique effect on performance. Although the mechanism was not revealed in the present studies, it is possible that positive affect and effort invested in the task increase as the interest deepens (Ainley, 2012). These processes, in turn, facilitate the emergence of mastery experiences, and keep the mind open to various ideas and strategy options (Fredrickson, 2001). Third, individual interest in the subject of the task contributed to the learning gain, measured as an increase between the pre- and post-test scores (Study IV). Thus, in accordance with previous studies concerning the beneficial effect of individual interest on performance, and the interrelations with prior knowledge and effort investment (Prenzel, 1992; Renninger, 1998), it was shown that, in terms of learning, those with a higher interest in the content benefited more from the simulation sessions than those with less interest.

Finally, students working on the more concrete simulation type performed better in the post-test than those with the more abstract version. Although previous studies have supported the use of *concreteness fading*, and have shown its beneficial effects on learning in undergraduate samples (McNeil & Fyfe, 2012; Son & Goldstone), it may be that the results are partly dependent on the students' age and knowledge base (Jaakkola & Veermans, 2013). Indeed, younger students may also benefit from sequentially proceeding from more to less concrete task elements, but they may need to work longer with the concrete elements before switching to the more abstract ones. Such a procedure might help to ensure the formation of initial comprehension, and perhaps also increase the likelihood of finding meaningful links with personal experiences.

However, neither goal orientations nor situational interest directly contributed to the learning outcome measures in any of the three studies. Although mastery-intrinsic, mastery-extrinsic and performance-approach goals or orientations have been shown to be positively associated with academic achievement (e.g., GPAs, Hulleman, Schrager, et al., 2010; Pekrun et al., 2006; Tuominen-Soini et al., 2011), there is less knowledge about how they relate to task-specific performance. Both mastery and performance-approach goals have been found in some studies to contribute to task performance (Haydel & Roeser, 2002; Kumar & Jagacinski, 2011). With regard to situational interest and task achievement, most findings show from small to moderate positive effects (Ainley, Hidi et al., 2002; Niemivirta, 2002). However, it has been suggested (Rotgans & Schmidt, 2011) that it is not reasonable to expect such motivational variables to influence academic achievement directly: rather, their effect might be indirect, mediated by task-relevant behaviour (e.g., persistence). The lack of such a measure in the present studies could partly explain the non-significant effects of motivation on task performance. It is also possible that even high motivation will not result in higher levels of learning during such a limited working period, especially when the content is novel.

3.2 The theoretical implications

The main theoretical contributions of this thesis can be summarized in two main points. First, the studies represent an attempt to combine individual and situational perspectives on motivation. It can be concluded from the results that student motivation in a learning context is characterized by certain individual tendencies and more transient states in the immediate situation. Studies adhering to such a holistic perspective on motivation have started to emerge, having long been ignored in the research. However, there are still fewer examples of studies combining personal achievement goal orientations with student situational interest, especially from a person-centred perspective. Fewer studies also simultaneously address the evolving nature of students' motivational states during authentic learning tasks. Second, the sub-studies enhance understanding of the different individual and task effects that contribute to students' motivational states. It could also be argued that without acknowledging possible interaction effects, the results may give too simplified a picture of the formation and origins of motivational states.

In terms of achievement goal theory, the results of the thesis give empirical support to insights presented in the early theorizing. Thus, the theoretical claims on which the studies are based are not novel. However, the role of personal goal orientation *profiles* in students' subjective perceptions and motivational states has rarely been empirically tested. With respect to research on student interest,

the results of the studies shed further light on the extent to which the evolvement of situational interest during learning depends on both individual and situational factors, and their interaction. It could thus be concluded that ″being situational″ should not be equated with ″determined by situational factors″: the interaction between the student and the task seems to be a continuous process from the *catching* to the *holding* phases of situational interest.

All in all, I would claim that the results of this thesis are compatible with the principles of interactionism and the model of the cognitive-affective personality system presented in the Introduction (see Figure 1). First, students with different motivational mind-sets (or activated mental units) seem to attend to and perceive certain situational features differently. Nevertheless, there was congruence in their perceptions, illustrating the role of the ″objective″ situation or shared meanings in their perceptions and reactions. Different mental units seemed to activate motivational states in a coherent manner, which, in turn, were found to evolve and reciprocally activate each other. This evolvement and interaction, in turn, appeared to proceed as a function of the feedback the students obtained during the task, and to be guided by their individual motivational resources. Finally, these processes had consequences in terms of behavioural responses, in other words the performance outcomes.

In sum, according to the results of the studies, the dynamics between the student and the context in producing motivational states is a complex combination of various interdependent effects. Nevertheless, there were also some systematic trends in the interactions and processes. The findings thus appear to support and to be compatible with views emphasizing, first, the adaptive function of students' individual motivational tendencies in their perceptions and situational interpretations (Dweck, 1996; Nicholls, 1989, Boekaerts & Niemivirta, 2000); second, the process-oriented nature of motivational states (Ainley, 2012); and third, the dynamic systems perspective on human functioning (Ainley, 2012; Lewis, 2000). The last-mentioned approach incorporates many interactionist conceptions assuming a network of continuous interactions within mental processes, and the interdependence of individual and social systems (see Volet & Vauras, 2013; Volet, Vauras, & Salonen, 2009). However, due to various conceptual restrictions and methodological limitations, the present studies do not fully reflect the situated, context-based, and process-oriented nature implied in these perspectives, and thus leave a wide room for future research addressing these issues.

3.3 Limitations and suggestions for future research

One fundamental question that I have felt the need to consider during the research process concerns the *essence of the constructs* that are used to describe

an individual's psychological processes and ongoing states. We talk about ″achievement goal orientations″ and ″interests″ as entities, as if they had a direct referent in the human mind. As to this ″entity-problem″, it is acknowledged that psychological phenomena must be labelled and defined somehow, in order to establish a shared meaning (at least to some extent). At the same time, it must be kept in mind that ″such operationalization remains a methodological construction″ (Valsiner, 1992, p. 29) that inevitably represents only a restricted aspect of the psychological phenomenon. At best, then, depending on the quality of our operationalization and research methods, it offers insights into certain phenomena or their manifestations that may be useful in order to understand and describe psychological functioning. The key constructs referred to in this thesis (e.g., achievement goal orientations) represent well-established concepts in the research on motivation, but the operationalization differs to some extent from what is apparent in mainstream literature. It is acknowledged that there are many ways of defining and operationalizing goal-related concepts, and that their validity and usefulness as theoretical tools are verified only through systematic empirical research. To the extent that their construct validity can be examined by analytical means, the present studies meet the statistical criteria relatively well.

A related notion is that in this thesis, motivation is viewed from one perspective and is approached from certain conceptual angles. Thus, the resulting picture of the motivational functioning of a student in a learning situation is restricted to certain aspects of the phenomenon. Although, in my opinion, the chosen constructs represent key concepts in terms of describing the energizing and guiding role of motivation, other useful concepts (e.g., self-attributes and ability perceptions) or theoretical frameworks fall beyond the scope of this research. However, given the need to impose rational conceptual restrictions in empirical investigations, a more critical limitation perhaps concerns the focus on motivation in terms of individual processes.

Although some aspects of the role of the situation are addressed in the present studies, less account is taken of the role of the social context in students' motivational tendencies and states. This is not to deny its importance: many investigations show how peers, classroom social networks and climate, teacher and student relationships, the school ethos, parenting and cultural norms shape students' more stable motivational structures and their situational motivational reactions (Lerkkanen et al., 2012; Nelson & DeBacker, 2008; Urdan, Solek, Schoenfelder, 2007; Walker, 2008). It has been suggested, for example, that students' interactions with peers during task engagement influence the arousal and maintenance of interest experiences (Thoman, Sansone, & Pasupathi, 2007; Thoman, Sansone, Fraughton, & Pasupathi, 2012). Although the students under investigation in Studies III and IV worked in pairs, peer interactions fall beyond

the scope of this work. Future studies should pay more attention to the phenomenon of *socially shared motivation* (Järvelä, Järvenoja, & Veermans, 2008*)*, as well as to measurement techniques that would take peer influences better into account. Recent theoretical notions that arise from the dynamic systems perspective call for the integration of individual and social levels of analysis and acknowledges the possibility of multiple agents (e.g., individual – group) in the regulation of learning and motivation (Vauras & Volet, 2013; Volet et al., 2009). These notions appear promising in this respect. Further, it would important be to examine the role of social achievement goals (e.g., Ryan & Shim, 2006; Urdan & Maehr, 1995) in students' motivational states within different types of task contexts involving both individualistic and more collaborative working formats. The focus in the present studies was primarily on the students' competence-related goal orientations, thus excluding other types of goals that are nevertheless strongly present in the school context.

I also acknowledge the absence of other possible sources of social effects from the data. With regard to the development of students' motivational tendencies and corresponding states during learning tasks, under-researched but nevertheless highly relevant aspects of the social context include the broader *motivational climate* within which the work occurs. Further research could focus, for example, on the ″error climate″ of the situation and its manifestations in social interactions (see Tulis, 2013). Recent studies suggest that in the experiences of students, emphasizing mastery in the classroom coincides with expecting and receiving emotional support (e.g., mutual respect) from the teacher (Patrick, Kaplan, & Ryan, 2011; Skaalvik & Skaalvik, 2013; Turner, Gray, Anderman, Dawson, & Anderman, 2013). Consequently, the perceived nature of socio-emotional interactions seem to play a significant role in students' classroom experiences, and are therefore, also likely to influence the activation and development of their motivational tendencies and cognitive-affective states during learning (Meyer & Turner, 2002). Another crucial aspect is what students perceive to be the function of academic work in general: what the culture of schooling demands from them is embedded in every task that is performed within that context (Maehr & Anderman, 1993). Thus, it would be useful to combine longitudinal data from different levels of analysis within the *same* learning context and thus to enhance understanding of the larger framework of students' situated experiences.

Methodological concerns

Students' individual motivational tendencies and situational states were in the present studies measured through self-reports. As mentioned above, decisions made in terms of research methods inevitably restrict the substantive scope of the psychological phenomena under study. Thus, it is acknowledged that the

procedure of responding to highly structured questionnaires with a limited item pool influences the resulting conceptions, and the inferences drawn from the underlying phenomena, at least to some extent. However, with regard to the measurement of individual goal orientations, both the operationalization and the item selection were formulated and revised in a process of thorough theoretical consideration and empirical testing. The revisions were also based on research results obtained through other methods (e.g., student interviews). Even so, I do not deny that interview data might have given a deeper and considerably enriched understanding of students' goal strivings in reducing the likelihood of the now-that-you-mention-it effect, and by allowing students to explain their reasons for aiming at certain goals (see Urdan & Mestas, 2006). At the same time, it should be noted that the age of the students is challenging in terms of studying these relatively multifaceted psychological constructs. On the one hand, lower-elementary school students might find it difficult to verbalize their higher-order intentions in an interview situation, and on the other hand, the reconstruction of a self-report questionnaire requires an understanding of students' ability to interpret and understand the items. Hence, both methods have their strengths and weaknesses, and combining them would perhaps be the best strategy. In particular, when the objective is to capture students' transient motivational states, the use of video-recordings and recalled interviews would facilitate examination of observable task engagement and of their own interpretations of the ongoing processes, and complement the information gathered from self-reports. Such data would also be helpful in tracking the possible reasons for motivational changes during the task (see Järvelä, Järvenoja, & Malmberg, 2012; Järvenoja & Järvelä, 2005).

Some researchers examining the role of classroom goal structures in students' motivation have questioned the appropriacy of self-reported perceptions as a method in this context (Linnenbrink, 2005). Although it has been acknowledged that ″subjective experience″ of the classroom may be more influential than objective instructional practices, there has been concern about the validity of students' perceptions as an information source (Kaplan, Middleton, Urdan, & Midgley, 2002; Wolters, Fan, & Daugherty, 2011). My perspective is slightly different in that I believe the relevant question concerns what is being measured. If the aim is to capture students' experiences of the environment, one way of doing so is through self-reported perceptions. However, if the objective is to investigate what really happens in the classroom, other methods are more appropriate (e.g., observations). I claim that these methods should not be compared as alternative ways of measuring the same phenomena because that is not what they do. Subjective perceptions are subjective: they are interpretations of the environment, filtered through each student's own mind-set. These perceptions cannot be used as a basis for drawing inferences or implications

about the actual classroom environment, although they may be informative as such. Observations and video-recordings may tell a different story, but that is not an indication of the inappropriateness of self-report data. However, it is evident that these two sources may complement each other in relevant ways, and thus help to enhance understanding about the formation of students' subjective perceptions. Research in this area is needed, as thus far there are few studies that combine and systematically compare data obtained from observations and students' self-reported classroom perceptions. Another alternative to self-reports would be to interview students about their classroom experiences (see Koskey, Karabenick, Woolley, Bonney, & Dever, 2010; Patrick et al., 2011; Urdan, 2004). The question of how students with different goal orientation profiles interpret actual classroom events, practices and interactions remains open, however. Interview methods might well serve this purpose due to the embedded and complex nature of goal cues in the school environment (Marshall & Weinstein, 1984).

Measurement issues

Several points arose concerning the operationalization and measurement of the key constructs. First, the conceptual scope of student interest in certain school subjects does not, by and large, cover the definition of individual interest. It would be useful to measure interest in the domain in general and in related school subjects in order to examine their relations, and their distinctive predictive effects on task engagement. It is possible that the associations with prior knowledge, for example, differ depending on the scope of the interest measure. Further, a single-item scale is not optimal for measuring a relatively broad concept, and does not allow the assessment of internal consistency. However, in order to keep the length of the questionnaires reasonable and, more importantly, the items as unambiguous as possible, single-item scales were used in Studies III and IV to measure both subject-specific and situational interest. Single-item scales or emoticons have been used in several studies (Ainley, 2006; Palmer, 2009; Tulis & Ainley, 2011) to measure situational interest, and are considered ecologically sound for assessing ongoing states that minimizes disturbance during the engagement process (see Ainley & Patrick, 2006). On the assumption that both situational and individual interest derive from the same phenomenological *experience of interest*, and in order to avoid confusion and differing interpretations among the students, it was decided to refer explicitly to the term *interest* in the measurement of both.

The measurement of transient states during engagement is difficult. A decision concerning what is reasonable in terms of measurement intervals and the number of variables depends on the task type and also on the age of the students. In fact, it is not possible to measure subjective states without

interrupting students' engagement, although some means may be less intrusive than others. In this case, the students filled in paper-and-pencil self-report questionnaires during a certain phase of the task (Studies II, III and IV). One disadvantage of such a procedure is that because the prompt to answer is embedded in the worksheets, there is a risk that the items go unnoticed thus creating a missing-data problem. Moreover, even though the reporting is not time-consuming, respondents may find the repetition of the same questions annoying. Consequently, it is necessary to take students' experiences of the measurements into account in order to achieve a balance and therefore improve the reliability of the results. It would be useful in future studies to use on-line measures of students' reactions. The works of Ainley and colleagues (Ainley & Hidi, 2002; Ainley et al., 2005; Ainley & Patrick, 2006) are good examples of how the advantages of computer-based techniques can be exploited in data collection. The software they use allows several indicators of involvement (e.g., the time students spend during different phases of the task and on task-related choices) to be monitored and recorded simultaneously, thereby providing important data on the processes that could mediate the effects of the motivational state on learning. This kind of data describing students' actual engagement as more of a process also facilitates consideration of person-context interactions in line with a dynamic systems perspective (Ainley, 2012).

Thus far, relatively few studies focus on the development of motivational states, although the numbers are increasing. It would be worthwhile applying the repeated measures design in learning episodes of varying length (see e.g., Rotgans & Schmidt, 2011), and following patterns of change within the same sample on different and successive occasions. Researchers should try to find a way of tracing the relationship between situational experiences and students' subsequent motivational tendencies, or concrete manifestations of them (e.g., self-initiated investment in learning and course choices). Even allowing for the possibility that even single (or at least cumulative) positive learning experiences work as a stimulus for continuing motivation, it is not known how such a process would unfold. There is thus need for longitudinal research combining micro- and macro-level data on students' motivation.

Does experimental equal artificial?

The use of experiments in educational research is open to criticism concerning the relevance of the setting or the tasks that students are given and, consequently, the generalizability of the results beyond experimental conditions. The students participating in Studies II, III, and IV were aware of the ongoing research, and the sessions were guided by researchers. Thus, the conditions did not fully correspond to the ordinary classroom situation. However, the experiments were implemented in authentic classroom contexts and with

learning tasks that *might* have been part of the general curriculum. The computer-based simulations used in the three studies could also be taken to represent a type of learning task that will probably be used more and more in instruction in the near future. They were also relevant in terms of examining motivational change during engagement: they incorporated challenge, new experiences and feedback, and most of the students were expected to perceive them as meaningful and interesting. At the same time, the dynamic and interactive nature of the tasks was conceived of as a potential source of change in students' motivational responses during engagement. It was also assumed that the different simulation versions used in Studies III and IV included elements that would interact with students' individual motivational tendencies.

However, according to the results of Studies III and IV the differences between the simulation versions in the two task conditions were relatively subtle and, consequently, did not induce as strong effects or group differences as expected. In Study III, the task condition did not predict students' situational interest during the task. Similarly, in Study IV there were no apparent main effects of the task condition on the change in situational interest or on post-test performance. The fact that the positive effect of the task condition on performance reported in Study III was not replicated in Study IV may have been due to the small revisions made to the study design between the two studies. Although there were no changes in the simulation program, there were minor revisions to the students' paper-and-pencil worksheets and the pre- and post-test items. The measurement format of situational interest also changed, from emoticons (ranging from 1 to 5) to a numeral scale (ranging from 1 to 7). These changes may have influenced the differences between the observed effects, and replication of the revised study design might clarify the inconsistent results.

In sum, although the study design served the practical purpose of comparing two alternative simulation versions in terms of their suitability for science lessons in elementary school, it was not as effective on the theoretical level in teasing out the possible task effects. Efforts should therefore be made in future studies focusing on the motivational dynamics between the student and the task to ensure that the differences between the task conditions are clearer, while at the same time taking into account the ecological validity of the tasks. More attention should also be given to the relevance of the situational or task element on which the comparison between conditions is based. In order for a dispositional tendency to make a difference in terms of subsequent responses, the situational cues should be such that they are likely to activate the personal characteristics in question (Mischel, 2004). In the case of students' achievement goal orientations, relevant features would include the performance- vs. learning-centeredness of the situation, and the possibility to choose the level of challenge. Although several previous studies examine the influence of the evaluation focus

on students' situational goals and response patterns (Barron & Harackiewicz, 2001; Butler, 2006), very few take individual motivational tendencies into account. It would be interesting, for example, to investigate the interaction effects of the student and task characteristics during high-stake tasks (e.g., tests) performed in conditions with a different error climate or goal structure focus (i.e., learning vs. performance). It would also be highly relevant to include variables measuring the emotional consequences of task-specific achievement. Research results have shown that students emphasizing mastery-extrinsic and performance goal orientations are sensitive to emotional stress, despite their capacity for high achievement (Tuominen-Soini et al., 2008, 2011, 2012). Therefore, the possibility of replicating similar patterns of results in experimental conditions, thereby creating an apparent person-environment fit, should be tested. The paradox seems to be that students who prefer and seek normative evaluation are simultaneously highly vulnerable to the detrimental effects of achievement pressure (Niemivirta, 2002).

It is obvious that the small sample sizes of the studies limit the generalizability of the results. However, this is relatively typical of quasi-experimental studies conducted in a classroom context: the implementation of an experiment with several separate data collection phases is time-consuming and requires commitment from teachers and students alike. Thus, the main focus of these small-scale studies was on identifying certain patterns in the dynamic interplay between the student and task characteristics and the situational responses, which could then be further examined in subsequent studies. All the observed results thus warrant replication with larger samples, with similar and various task types, and in similar and various situations. This conclusion also derives from findings indicating the situation and task specificity of certain patterns of relations, especially of those concerning the evolvement of students' situational responses. The relations between the variables may also be partly dependent on the students' age. At least, it seems from the results of previous studies that the role of mastery-extrinsic and performance-related goal orientations becomes more distinctive with age (Bong, 2009). Thus, it may be that the predictive power of these orientations is stronger in terms of the interest constructs among older students. Similarly, with regard to individual interest, it might be that among older students the interrelations with prior knowledge were clearer. However, in addition to the effects of age, the association is also likely to be influenced by the phase of students' interest development (Renninger, 2009).

Although perhaps not being the main issue in terms of generalizability, the sample size is more critical in terms of evaluating the appropriateness of analytical decisions. The sample size in Study III inhibited the use of person-centred methods in analysing the role of achievement goal orientations in task engagement. Moreover, the presented empirical model concerning the predictive

relationships between the variables also lacked statistical power and the observed effects remained weak (Study III). The larger sample sizes in Studies I and IV might have produced different numbers of and more representative orientation groups. However, despite the measurement and sample differences, the identified orientation groups included similar elements both with each other, and when compared to previous studies (see Niemivirta, 2002; Roeser, Strobel, & Quihuis, 2002; Seifert, 1995).

3.4 Practical implications

The implications in terms of promoting student motivation in the classroom depend inevitably on what is considered the primary ″locus of motivation″ (Kaplan et al., 2012, p. 167). Given that the results of this study were in accordance with the theoretical notions of the interactionist perspective, the practical implications are similarly based on the assumption of interplay between the student and the environment. Kaplan and colleagues (2012) suggest that such a perspective encourages practitioners to ″focus on changing the environment with the aim of nurturing the motivational resources of the person″ (Kaplan et al., 2012, p. 167). I agree with the statement, but would also consider several other aspects that might complement or perhaps clarify it. First, ″the aim of nurturing the motivational resources of the person″ implies that such resources are recognized, and that the educator is aware of the possible ways the ″personal motivation″ may be understood. Second, it is equally important to focus on students with weaker pre-existing motivational resources, and to consider ways of compensating for their less adaptive predispositions.

Thus, in my view, enhancing teachers' knowledge about the different goals students may strive towards in classroom situations, and the potential adaptive or detrimental consequences, would be the first step in this direction. It should be acknowledged that the meaning of classroom situations or tasks is, to some extent, subjectively construed, which is why students approach them differently. It is much easier for some students to become directly involved in the learning tasks and to find them intrinsically rewarding, whereas others may need more extrinsic motivational support to get started. Additionally, performance-focused learners who approach the tasks with high initial motivation may be more likely to lose motivation if the task or their progress in it does not correspond to their expectations. Consequently, students seem to differ in terms of motivational incentives, and in the support they need during different phases of the task. Although it may not be difficult to nurture the motivational resources of students primarily pursuing mastery goals, such as by providing them with appropriately challenging tasks and allowing autonomy and choice, more attention should be given to those aiming towards other kinds of goals. No specific recommendations

arise from the four studies, but in line with the stated theoretical assumptions, I would suggest focusing on cues in the environment that are likely to activate or enforce students' adaptive *or* maladaptive motivational tendencies.

In my view, the findings concerning students' classroom preferences (Study I) lie at the heart of the matter: in *all* the goal orientation groups, the students considered an emphasis on learning and improvement to be more important than an emphasis on ability and evaluation. However, it is not straightforward to derive practical suggestions from this observation. It would be tempting to conclude that the answer would be just to avoid emphasizing competition and normative evaluation, and instead to provide all students with mastery-focused experiences. However, based on our results, one should be cautious of offering simple solutions, at least not without admitting ignorance in terms of how to ensure that such suggestions would turn into instructional practices conveying the same message to all students. More knowledge is needed about how students with weaker perceptions interpret the meaning of ″emphasizing learning and mastery″, and why their interpretations differ from those of their classmates.

However, bearing in mind these words of caution, I would suggest that it is worth following recommendations to emphasize learning, individual improvement and recognition of mistakes as a natural part of the process. Even though students' perceptions might differ, these procedures may well be the ones that promote the activation of mastery-oriented tendencies, or *do not* increase the likelihood of performance concerns or avoidance tendencies. Alongside more general classroom practices, this also applies to specific task conditions. In Study IV, for example, with no experimentally induced situational goal structure or pressure to perform or succeed, differences in motivational states still emerged: even in the absence of any extrinsic performance pressure, one group of students seemed to be more vulnerable to the challenge implicit in the task. If such differences exist in relatively neutral task conditions, one could speculate about the outcome in situations in which there is a more salient possibility of failure and a stress on normative evaluation.

The possibility that students in the same classroom may differ in terms of perceptions and preferences should be taken into account, especially in the planning and implementation of pedagogical interventions. The results of Study I demonstrated that some students are content with a relatively passive role as learners, whereas others are more eager to participate and take responsibility in the classroom. Implicit in some pedagogical approaches (e.g., inquiry-based learning) seems to be the assumption that all students share certain qualities (e.g., self-regulation skills) and are inherently willing to participate, to be active and to take on challenges if given the opportunity (for more on cognitive demands, see Kirschner, Sweller, & Clark, 2006). Self-initiation, active participation, high motivation and autonomy are qualities that many mastery-

and success-oriented students may share, but what about the others? It would certainly *not* be advisable to allow students always to follow their own preferences, but perhaps they could be acknowledged in terms of incorporating different working formats (both individual and group work) and providing tasks with gradually increasing autonomy requirements. I would also consider it vital to combine pedagogical interventions with simultaneous and sufficient motivational support. The initiation of help-seeking should not be only the student's responsibility: it is known from previous studies that those who would need help the most rarely ask for it (Karabenick, 2004).

Just as the ″objective″ classroom environment and students' perceptions of it do not always coincide, neither do the intended motivating task characteristics and students' reactions to them. In the present research, the learning tasks elicited different levels of interest and self-efficacy among the students at the very start of the engagement. Thus, the overall level of aggregated ratings evens out the individual differences in responses, and although it may be possible to make some generalizations about interest-arousing task elements based on the overall means, they would apply only to some of the students. Consequently, it should be acknowledged that although certain task characteristics (e.g., concreteness, novelty and interactivity) may, for most students, ease the arousal and support the maintenance of situational interest, some will still find it difficult to engage with the task right from the start. For them, motivational support in finding personal relevance or value in the task should be available. The findings of the studies do not reveal the key factor involved in suppressing the activation of maladaptive motivational tendencies that interfere with task engagement. Once again – and reflecting the results of other studies – it is likely that the general motivational climate of the task situation has an effect: emphasizing free exploration, allowing students to progress at their own pace and showing emotional support and mutual respect (Patrick et al., 2011), may facilitate the involvement of all students, even though not totally eliminating individual differences.

There is no doubt that the implications presented here emphasize the need for teacher sensitivity in recognizing students' individual differences in the quality of their motivation. The ″same works for all″ approach is not a useful guideline, if the aim is to promote motivation among different types of students, although it is not reasonable to expect individually tailored learning situations and tasks either. Perhaps one of the best approaches would be to understand the vulnerability of the self-system among students with dominant performance-related or avoidance goal tendencies. Their adaptive coping with various demands of the learning situations can be supported, as long as the nature of the goals guiding their actions is understood.

3.5 Conclusions

Returning to the ″motivational lenses″ through which I started to describe the main theme of this thesis, I am now in the position to conclude that these lenses matter. Students enter the learning or achievement situation with different motivational resources that shape the way they interpret its meaning, and how they approach and engage with the tasks. The findings also suggest that this happens (partly) independently of their competence or level of prior knowledge. Consequently, the question is not necessarily whether or not students *can* do something, but whether or not they *think* they can, and whether they find it personally important to become engaged with and invest effort in working. This experienced importance, or lack of it, arises to some extent from higher-order goals that also define the underlying reason *why* achievement is considered important.

The fact that a personally held orientation towards learning is manifested in situational engagement suggests that some students are likely to have more positive and enjoyable learning experiences far more often than others. I would claim that this is one of the reasons why examining these micro-level, task-specific processes is of importance. If cumulative learning experiences are understood to pave the way for maintaining self-initiated motivation that helps students to adapt to the challenges of schooling, the need for more knowledge about the processes involved is obvious. Furthermore, shedding light on the *origins* of such processes would help in finding ways to influence them.

Having extensively discussed the studies presented in this thesis, I am even more convinced of the need in future studies to better address the complexity of the human motivational system. There are no simple answers, motivation being a complex phenomenon. I also believe in taking a holistic perspective on students' functioning in order to capture the consistencies and variance in thoughts and actions in different achievement situations. Inherent in this conception is the quest to comprehend educational outcomes from a broad perspective: knowledge and competence do not go very far without motivation and interest. Indeed, motivation and interest are at the core of students' everyday well-being, and supporting their development should be a self-evident goal of education.

REFERENCES

Ainley, M. (2006). Connecting with learning: Motivation, affect and cognition in interest processes. *Educational Psychology Review*, *18*, 391–405.

Ainley, M. (2010). Interest in the dynamics of task behavior: Processes that link person and task in effective learning. In T. C. Urdan, & S. A. Karabenick (Eds.), *The decade ahead: Theoretical perspectives on motivation and achievement*. *Advances in motivation and achievement,* (Vol. 16A, pp. 235–264). London, England: Emerald.

Ainley, M. D. (2012). Students' interest and engagement in classroom activities. In S.L. Christenson, A.L. Reschly, & C. Wylie (Eds), *Handbook of Research on Student Engagement* (pp. 283–302). New York: Springer.

Ainley, M., & Ainley, J. (2011). A cultural perspective on the structure of student interest in science. *International Journal of Science Education, 33,* 51–71.

Ainley, M., Buckley, S., & Chan, J. (2009). Interest and efficacy beliefs in self-regulated learning: Does the task make a difference? In M. Wosnitza, S. A. Karabenick, A. Efklides, & P. Nenninger (Eds.), *Contemporary motivation research: From global to local perspectives* (pp. 207–227). Cambridge, MA: Hogrefe.

Ainley, M., Corrigan, M., & Richardson, N. (2005). Students, tasks and emotions: Identifying the contribution of emotions to students' reading of popular culture and popular science texts. *Learning and Instruction, 15*, 433–447.

Ainley, M., & Hidi, S. (2002). Dynamic measures for studying interest and learning. In P. R. Pintrich, & M. L. Maehr (Eds.), *Advances in motivation and achievement: New directions in measures and methods,* (Vol. 12, pp. 43–76). Amsterdam: JAI.

Ainley, M. D., Hidi, S., & Berndorff, D. (2002). Interest, learning, and the psychological processes that mediate their relationship. *Journal of Educational Psychology, 94*, 545–561.

Ainley, M., Hillman, K., & Hidi, S. (2002). Gender and interest processes in response to literary texts: Situational and individual interest. *Learning and Instruction*, *12*, 411–428.

Ainley, M., & Patrick, L. (2006). Measuring self-regulated learning processes through tracking patterns of student interaction with achievement activities. *Educational Psychology Review*, *18*, 267–286.

Alexander, P. A., Jetton, T. L., & Kulikowich, J. M. (1995). Interrelationship of knowledge, interest, and recall: Assessing a model of domain learning. *Journal of Educational Psychology, 87*, 559–575.

Ames, C. (1992a). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*, 261–271.

Ames, C. (1992b). Achievement goals and the classroom motivational climate. In D. Schunk, & J. Meece (Eds.), *Student perceptions in the classroom* (pp. 327-348). Hillsdale, NJ: Erlbaum.

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Student learning strategies and motivation processes. *Journal of Educational Psychology, 80*, 260–267.

Anderman, L. H., & Anderman, E. M. (1999). Social predictors of changes in students' achievement goal orientations. *Contemporary Educational Psychology*, *24*, 21–37.

Anderman, E. M., Austin, C. C., & Johnson, D. M. (2002). The development of goal orientation. In A. Wigfield, & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 197–220). San Diego, CA: Academic Press.

Anderman, E. M., & Maehr, M. (1994). Motivation and schooling in the middle grades. *Review of Educational Research, 64,* 287–309.

Anderman, E. M., & Midgley, C. (1997). Changes in achievement goal orientations, perceived academic competence, and grades across the transition to middle-level schools. *Contemporary Educational Psychology, 22*, 269–298.

Anderman, E. M., & Young, A. J. (1994). Motivation and strategy use in science: Individual differences and classroom effects. *Journal of Research in Science Teaching*, *31*, 811–831.

Asch, S. E. (1952). *Social Psychology*. Englewood Cliffs, N.J.: Prentice Hall.

Atkinson, J. W. (1964). *An introduction to motivation*. Princeton, NJ: D. Van Nostrand Company.

Atkinson, J. W. (1974). The mainsprings of achievement-oriented activity. In J.W. Atkinson, & J. O. Raynor (Eds.), *Motivation and achievement* (pp. 13–41). Washington D.C.: V. H. Winston & Sons.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28,* 117–148.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology, 41*, 586–598.

Barron, K., & Harackiewicz, J. (2001). Achievement goals and optimal motivation: Testing multiple goal models. *Journal of Personality and Social Psychology*, *80*, 706–722.

Bergin, D. A. (1999). Influences on classroom interest. *Educational Psychologist, 34,* 87–98.

Bergman, L. R., & Andersson, H. (2010). The person and the variable in developmental psychology. *Zeitschrift Fur Psychologie, 218*, 155–165.

Bergman, L. R., & Magnusson, D. (1997). A person-oriented approach in research on developmental psychopathology. *Development and Psychopathology, 9,* 291–319.

Boekaerts, M., & Niemivirta, M. (2000). Self-regulated learning: Finding a balance between learning goals and ego-protective goals. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 417–450). San Diego, CA: Academic Press.

Bong, M. (2005). Within-grade changes in Korean girls' motivation and perceptions of the learning environment across domains and achievement levels. *Journal of Educational Psychology, 97*, 656–672.

Bong, M. (2008). Effects of parent-child relationship and classroom goal structures on motivation, help-seeking avoidance, and cheating. *The Journal of Experimental Education, 76,* 191–217.

Bong, M. (2009). Age-related differences in achievement goal differentiation. *Journal of Educational Psychology, 101*, 879–896.

Bouffard-Bouchard, T. (1990). Influence of self-efficacy on performance in a cognitive task. *The Journal of Social Psychology, 130,* 353–363.

Brown, M. C., McNeil, N. M., & Glenberg, A. M. (2009). Using concreteness in education: Real problems, potential solutions. *Child Development Perspectives, 3,* 160–164.

Butler, R. (1987). Task-involving and ego-involving properties of evaluation: Effects of different evaluation conditions on motivational perceptions, interest and performance. *Journal of Educational Psychology, 79*, 474–482.

Butler, R. (2000). Making judgments about ability: The role of implicit theories of ability in moderating inferences from temporal and social comparison information. *Journal of Personality and Social Psychology,78,* 965–978.

Butler, R. (2006). Are mastery and ability goals both adaptive? Evaluation, initial goal construction and the quality of task engagement. *British Journal of Educational Psychology, 76*, 595–611.

Chen, A., Darst, P. W., & Pangrazi, R. P. (2001). An examination of situational interest and its sources. *British Journal of Educational Psychology, 71*, 383–400.

Chin, W. W. (1998). The partial least squares approach for structural equation modeling. In G. A. Macoulides, (Ed.), *Modern methods for business research* (pp. 295–336). Mahwah, NJ: Lawrence Erlbaum Associates.

Church, M. A., Elliot, A. J., & Gable, S. L. (2001). Perceptions of classroom environment, achievement goals, and achievement outcomes. *Journal of Educational Psychology*, *93,* 43–54.

Covington, M. V. (1984). The motive for self-worth. In C. Ames, & R. Ames (Eds.), *Research on motivation in Education. Student Motivation* (Vol. 1, pp. 77–113). New York: Academic Press.

Covington, M. V., & Beery, R. G. (1976). *Self-worth and school learning*. New York: Holt, Rinehart & Winston.

Crocker, J., Brook, A. T., Niiya, Y., & Villacorta, M. (2006). The pursuit of self-esteem: Contingencies of self-worth and self-regulation. *Journal of Personality*, *74*, 1749–1771.

Daniels, L. M., Haynes, T. L., Stupnisky, R. H., Perry, R. P., Newall., N. E., & Pekrun, R. (2008). Individual differences in achievement goals: A longitudinal study of cognitive, emotional, and achievement outcomes. *Contemporary Educational Psychology, 33*, 584–608.

Deemer, S. A. (2004). Classroom goal orientation in high school classrooms: Revealing links between teacher beliefs and classroom environments. *Educational Research, 46,* 73–90.

Denissen, J. J. A., Zarrett, N. R., & Eccles J. S. (2007). I like to do it, I'm able, and I know I am: Longitudinal couplings between domain-specific achievement, self-concept, and interest. *Child Development, 78*, 430–447.

Dewey, J. (1913). *Interest and effort in education*. Boston: Riverside Press.

Diener, C. I., & Dweck, C. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy, and achievement cognitions following failure. *Journal of Personality and Social Psychology, 36,* 451–462.

Diener, C. I., & Dweck, C. (1980). An analysis of learned helplessness: II. The processing of success. *Journal of Personality and Social Psychology, 39,* 940–952.

Duda, J. L., & Nicholls, J. G. (1992). Dimensions of achievement motivation in schoolwork and sport. *Journal of Educational Psychology, 84*, 290–299.

Durik, A. M., & Harackiewicz, J. M. (2007). Different strokes for different folks: How individual interest moderates the effects of situational factors on task interest. *Journal of Educational Psychology, 99*, 597-610.

Durik, A. M., & Matarazzo, K. L. (2009). Revved up or turned off? How domain knowledge changes the relationship between perceived task complexity and task interest. *Learning and Individual Differences, 19*, 155–159.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*, 1040–1048.

Dweck, C. S. (1992). The study of goals in psychology. *Psychological Science, 3*, 165–167.

Dweck, C. (1996). Capturing the dynamic nature of personality. *Journal of Research in Personality, 30,* 348–362.

Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories: Elaboration and extension of the model. *Psychological Inquiry, 6*, 322–333.

Dweck, C. S., & Elliott, E. S. (1983). Achievement motivation. In E. M. Hetherington (Ed.), *Handbook of child psychology: Socialization, personality, and social development* (Vol. 4, pp. 643–691). New York, NY: John Wiley & Sons.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256–273.

Eccles, J. S., & Midgley, C. (1989). Stage-environment fit: Developmentally appropriate classrooms for young adolescents. In C. Ames, & R. Ames (Eds.), *Research on motivation in education* (pp. 139–186). San Diego, CA: Academic Press.

Eccles, J., Wigfield, A., & Midgley, C. (1993). Negative effects of traditional middle schools on students' motivation. *Elementary School Journal, 93*, 553–574.

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34*, 169–189.

Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology*, *70*, 461–475.

Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology*, *80*, 501–519.

Elliot, A. J., McGregor, H. A., & Gable, S. L. (1999). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of Educational Psychology, 91*, 549–563.

Elliot, A. J., Murayama, K., & Pekrun, R. (2011). A 3 x 2 achievement goal model. *Journal of Educational Psychology, 103*, 632–648.

Elliot, A. J., & Thrash, T. M. (2001). Achievement goals and the hierarchical model of achievement motivation. *Educational Psychology Review, 13,* 139–156.

Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology*, *54*, 5–12.

Endler, N. S. (1975). The case for person-situation interactions. *Canadian Psychological Review, 16,* 12–21.

Endler, N. S. (1983). Interactionism: a personality model, but not yet a theory. In M. M. Page (Ed.), *Nebraska Symposium on Motivation 1982: Personality–Current Theory and Research* (pp. 155-200). Lincoln: University of Nebraska Press.

Endler, N. S. (2000). The interface between personality and cognition. *European Journal of Personality, 14,* 377–389.

Ford, M. E., & Nichols, C. W. (1991). Using goal assessment to identify motivational patterns and facilitative behavioral regulation and achievement. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in Motivation and Achievement* (Vol. 7, pp. 51–84). Greenwich, CT: JAI Press.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56,* 218–226.

Fryer, J. W., & Elliot, A. J. (2007). Stability and change in achievement goals. *Journal of Educational Psychology, 99*, 700–714.

Gehlbach, H., Brown, S. W., Ioannou, A., Boyer, M. A., Hudson, N., Niv-Solomon, A., et al. (2008). Increasing interest in social studies: Stimulating simulations, self-efficacy, and social perspective taking. *Contemporary Educational Psychology, 33,* 894–914.

Goldstone, R. L., & Son, J. Y. (2005). The transfer of scientific principles using concrete and idealized simulations. *The Journal of the Learning Sciences, 14,* 69–110.

Gonida, E. N., Voulala, K., & Kiosseoglou, G. (2009). Students' achievement goal orientations and their behavioral and emotional engagement: Co-examining the role of perceived school goal structures and parent goals during adolescence. *Learning and Individual Differences, 19*, 53–60.

Graham, J., Tisher, R., Ainley, M., & Kennedy, G. (2008). Staying with the text: The contribution of gender, achievement orientations, and interest to students' performance on a literacy task. *Educational Psychology, 28*, 757–776.

Grant, H., & Dweck, C. S. (2003). Clarifying achievement goals and their impact. *Journal of Personality and Social Psychology, 85,* 541–553.

Greene, B. A., Miller, R. B., Crowson, H. M., Duke, B. L., & Akey, K. L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom perceptions and motivation. *Contemporary Educational Psychology, 29*, 462–482.

Harackiewicz, J. M., Barron, K. E., Tauer, J. M., Carter, S. M., & Elliot, A. J. (2000). Short-term and long-term consequences of achievement goals in college: Predicting continued interest and performance over time. *Journal of Educational Psychology, 92*, 316–330.

Harackiewicz, J. M., Barron, K. E., Tauer, J. M., & Elliot, A. J. (2002). Predicting success in college: A longitudinal study of achievement goals and ability measures as predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology, 94*, 562–575.

Harackiewicz, J. M., Durik, A. M., Barron, K. E., Linnenbrink-Garcia, L., & Tauer, J. M. (2008). The role of achievement goals in the development of interest: Reciprocal relations between achievement goals, interest, and performance. *Journal of Educational Psychology, 100*, 105–122.

Haydel, A. M., & Roeser, R. W. (2002). On motivation, ability, and the perceived situation in science test performance: A person-centered approach with high school students. *Educational Assessment, 8*, 163–189.

Heckhausen, J., & Heckhausen, H. (2008). Motivation and action: Introduction and overview. In J. Heckhausen, & H. Heckhausen (Eds.), *Motivation and action* (pp. 1–9). New York, NY: Cambridge University Press.

Hidi, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research, 60,* 549–571.

Hidi, S. (2001). Interest, reading, and learning: Theoretical and practical considerations. *Educational Psychology Review, 13,* 191–209.

Hidi, S. (2006). Interest: A unique motivational variable. *Educational Research Review, 1*, 69–82.

Hidi, S. & Baird, W. (1988). Strategies for increasing text-based interest and students' recall of expository texts. *Reading Research Quarterly*, 23, 465–483.

Hidi, S., Berndorff, D., & Ainley, M. (2002). Children's argument writing, interest and self-efficacy: An intervention study. *Learning and Instruction*, *12*, 429–446.

Hidi, S., & Harackiewicz, J. M. (2000). Motivating the academically unmotivated: A critical issue for the 21st century. *Review of Educational Research, 70*, 151–179.

Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist, 41*, 111–127.

Hoffmann, L. (2002). Promoting girls' interest and achievement in physics classes for beginners. *Learning and Instruction*, *4*, 447–465.

Hulleman, C. S., Durik, A. M., Schweigert, S. A., & Harackiewicz, J. M. (2008). Task values, achievement goals, and interest: An integrative analysis. *Journal of Educational Psychology, 100*, 398–416.

Hulleman, C. S., Godes, O., Hendricks, B. L., & Harackiewicz, J. M. (2010). Enhancing interest and performance with a utility value intervention. *Journal of Educational Psychology, 102*, 880–895.

Hulleman, C. S., Schrager, S. M., Bodmann, S. M., & Harackiewicz, J. M. (2010). A meta-analytic review of achievement goal measures: Different labels for the same constructs or different constructs with similar labels? *Psychological Bulletin, 136*, 422–449.

Hulleman, C. S., & Senko, C. (2010). Up around the bend: Forecast for achievement goal theory and research in 2010. In T. C. Urdan, & S. A. Karabenick (Eds.), *The decade ahead: Theoretical perspectives on motivation and achievement. Advances in motivation and achievement, (*Vol. 16A, pp. 71–104). London, England: Emerald.

Jaakkola, T. & Veermans, K. (2013). *Learning elementary physics with abstract and concrete simulations*. Manuscript submitted for publication.

Jonassen, D., Howland, J., Marra, R., & Crismond, D. (2008). *Meaningful learning with technology* (3rd ed.). Upper Saddle River, New Jersey: Pearson Education, Inc.

Järvelä, S., Järvenoja, H., & Malmberg, J. (2012). How elementary school students' motivation is connected to self-regulation. *Educational Research and Evaluation, 18,* 65–84.

Järvelä, S., Järvenoja, H., & Veermans, M. (2008). Understanding the dynamics of motivation in socially shared learning. *International Journal of Educational Research, 47*, 122–135.

Järvelä, S., & Niemivirta, M. (2001). Motivation in context: Challenges and Possibilities in studying the role of motivation in new pedagogical cultures. In S. Volet & S. Järvelä (Eds.), *Motivation in learning contexts: Theoretical advances and methodological implications* (pp. 105–127). Amsterdam: Pergamon/ Elsevier.

Järvenoja, H., & Järvelä , S. (2005). How students describe the sources of their emotional and motivational experiences during the learning process: A qualitative approach. *Learning and Instruction, 15*, 465–480.

Kaplan, A., Gheen, M., & Midgley, C. (2002). Classroom goal structure and student disruptive behaviour. *British Journal of Educational Psychology,72,* 191–211.

Kaplan, A., Katz, I., & Flum, H. (2012). Motivation theory in educational practice. Knowledge claims, challenges, and future directions. In APA Educational Psychology Handbook. In T. Urdan (Ed.), *Individual differences, cultural considerations, and contextual factors in educational psychology* (Vol. 2, pp. 165–194). Washington, DC: American Psychological Association. Ch. 7.

Kaplan, A., & Maehr, M. (1999). Achievement goals and student well-being. *Contemporary Educational Psychology, 24,* 330-358.

Kaplan, A., & Maehr, M. L. (2007). The contributions and prospects of goal orientation theory. *Educational Psychology Review, 19*, 141–184.

Kaplan, A., Middleton, M. J., Urdan, T., & Midgley, C. (2002). Achievement goals and goal structures. In C. Midgley (Ed.), *Goals, goal structures, and patterns of adaptive learning* (pp. 21–53). Mahwah, NJ: Erlbaum.

Kaplan, A., & Midgley, C. (1999). The relationship between perceptions of the classroom goal structure and early adolescents' affect in school: The mediating role of coping strategies. *Learning and Individual Differences, 11*, 187–212.

Karabenick, S. A. (2004). Perceived achievement goal structure and college student help seeking. *Journal of Educational Psychology, 96,* 569–581.

Kenrick, D. T., & Funder, D. C. (1988). Profiting from controversy: Lessons from the person-situation debate. *American Psychologist, 43,* 23–34.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, *41*, 75–86.

Kolić-Vehovec, S., Rončević, B., & Bajšanski, I. (2008). Motivational components of self-regulated learning and reading strategy use in university students: The role of goal orientation patterns. *Learning and Individual Differences, 18*, 108–113.

Koskey, K. L. K., Karabenick, S. A., Woolley, M. E., Bonney, C. R., & Dever, B. V. (2010). Cognitive validity of students' self-reports of classroom mastery goal structure: What students are thinking and why it matters. *Contemporary Educational Psychology, 35,* 254–263.

Krapp, A. (2007). An educational-psychological conceptualisation of interest. *International Journal for Vocational and Educational Guidance, 7,* 5–21.

Kumar, S., & Jagacinski, C. M. (2011). Confronting task difficulty in ego involvement: Change in performance goals. *Journal of Educational Psychology, 103,* 664–682.

Lau, S., & Nie, Y. (2008). Interplay between personal goals and classroom goal structures in predicting student outcomes: A multilevel analysis of person–context interactions. *Journal of Educational Psychology, 100*, 15–29.

Lee, C.-Y., & Chen, M.-P. (2009). A computer game as a context for non-routine mathematical problem solving: The effects of type of question prompt and level of prior knowledge. *Computers and Education 52*, 530–542.

Lerkkanen, M.-K., Kiuru, N., Pakarinen, E., Viljaranta, J., Poikkeus, A.-M., Rausku-Puttonen, H., Siekkinen, M., & Nurmi, J.-E. (2012). The role of teaching practices in the development of children's interest in reading and mathematics in kindergarten. *Contemporary Educational Psychology, 37,* 266–279.

Lewis, M. D. (2000). The promise of dynamic systems approaches for an integrated account of human development. *Child Development, 71,* 36–43.

Linnenbrink, E. A. (2005). The dilemma of performance-approach goals: The use of multiple goal contexts to promote students' motivation and learning. *Journal of Educational Psychology, 97,* 197–213.

Linnenbrink-Garcia, L., Pugh, K. J., Koskey, K. L. K., & Stewart, V. C. (2012). Developing conceptual understanding of natural selection: The role of interest, efficacy, and basic prior knowledge. *Journal of Experimental Education, 80,* 45–68.

Linnenbrink-Garcia, L., Tyson, D. F., & Patall, E. A. (2008). When are achievement goal orientations beneficial for academic achievement? A closer look at moderating factors. *International Review of Social Psychology, 21,* 19–70.

Luo, W., Paris, S. G., Hogan, D., & Luo, Z. (2011). Do performance goals promote learning? A pattern analysis of Singapore students' achievement goals. *Contemporary Educational Psychology, 36,* 165-176.

Maehr, M. L. (1984). Meaning and motivation. In R. Ames, & C. Ames (Eds.), *Research on motivation in education: Student motivation* (Vol. 1, pp. 115–144). New York, NY: Academic Press.

Maehr, M. L., & Anderman, E. M. (1993). Reinventing schools for early adolescents: Emphasizing task goals. *The Elementary School Journal, 93,* 593–610.

Magnusson, D., & Törestad, B. (1993). A holistic view of personality: A model revisited. *Annual Review of Psychology, 44,* 427–452.

Marshall, H. H. (1987a). Building a learning orientation. *Theory into Practice, 26,* 8–14.

Marshall, H. H. (1987b). Motivational strategies of three fifth-grade teachers. *The Elementary School Journal, 88,* 135–150.

Marshall, H. H. (1988). In pursuit of learning-oriented classrooms. *Teaching and Teacher Education, 4,* 85–98.

Marshall, H. H., & Weinstein, R. S. (1984). Classroom factors affecting students' self-evaluations: An interactional model. *Review of Educational Research, 54,* 301–325.

McCombs, B. L. (1986). The role of self-system in self-regulated learning. *Contemporary Educational Psychology, 11,* 314–332.

McDaniel, M. A., Waddill, P. J., Finstad, K., & Bourg, T. (2000). The effects of text-based interest on attention and recall. *Journal of Educational Psychology, 92,* 492–502.

McNeil, N. M., Fyfe, E. R. (2012). "Concreteness fading" promotes transfer of mathematical knowledge. *Learning and Instruction, 22,* 440–448.

McNeil, N. M., & Uttal, D. H. (2009). Rethinking the use of concrete materials in learning: Perspectives from development and education. *Child Development Perspectives, 3,* 137–139.

Meece, J. L. (1991). The classroom context and students' motivational goals. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in Motivation and Achievement: Goals and self-regulatory processes* (Vol 7, pp. 261–286). Greenwich, CT: JAI Press.

Meece, J. L., Glienke, B. B., & Burg, S. (2006). Gender and motivation. *Journal of School Psychology, 44,* 351–373.

Meyer, D. K., & Turner, J. C. (2002). Discovering emotion in classroom motivation research. *Educational Psychologist, 37,* 107–114.

Middleton, M. J., & Midgley, C. (1997). Avoiding the demonstration of lack of ability: An underexplored aspect of goal theory. *Journal of Educational Psychology, 89,* 710–718.

Mischel, W. (2004). Toward an integrative science of the person. *Annual Review of Psychology, 55,* 1–22.

Mischel, W., & Peake, P. K. (1983). Analyzing the construction of consistency in personality. In M. M. Page (Ed.), *Nebraska Symposium on Motivation 1982: Personality–Current Theory and Research* (pp. 233–262). Lincoln: University of Nebraska Press.

Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review, 102*, 246–268.

Mitchell, M. (1993). Situational interest: Its multifaceted structure in the secondary school mathematics classroom. *Journal of Educational Psychology, 85*, 424–436.

Moos, D. C., & Azevedo, R. (2008). Exploring the fluctuation of motivation and use of self-regulatory processes during learning with hypermedia. *Instructional Science, 36*, 203–231.

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology*, *38*, 30–38.

Murayama, K., & Elliot, A. (2009). The joint influence of personal achievement goals and classroom goal structures on achievement-relevant outcomes. *Journal of Educational Psychology*, *101*, 432–437.

Muthén, L. K., & Muthén, B. O. (1998–2006). *Mplus user's guide* (5th ed.). Los Angeles, CA: Muthén & Muthén.

Nelson, M. R., & DeBacker, T. K. (2008). Achievement motivation in adolescents: The role of peer climate and best friends. *Journal of Experimental Education*, *76*, 170–189.

Nicholls, J. G. (1984a). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*, 328–346.

Nicholls, J. G. (1984b). Conceptions of ability and achievement motivation. In R. Ames & C. Ames (Eds.), *Research on Motivation in Education: Student Motivation* (Vol. 1, pp. 39–73). New York: Academic Press.

Nicholls, J. G. (1989). *The competitive ethos and democratic education*. Cambridge, MA: Harvard University Press.

Nicholls, J. G., Patashnick, M., & Nolen, S. B. (1985). Adolescents' theories of education. *Journal of Educational Psychology, 77*, 269–287.

Niemivirta, M. (1998). Individual differences in motivational and cognitive factors affecting self-regulated learning: A pattern-oriented approach. In P. Nenniger, R. S. Jäger, A. Frey, & M. Wosnitza (Eds.), *Advances in motivation* (pp. 23–42). Landau, Germany: Verlag Empirische Pädagogik.

Niemivirta, M. (2002). Motivation and performance in context: The influence of goal orientations and instructional setting on situational appraisals and task performance. *Psychologia*, *45,* 250–270.

Niemivirta, M. (2004). *Habits of mind and academic endeavors: The correlates and consequences of achievement goal orientations*. Research report 196, University of Helsinki, Department of Education. Helsinki, Finland: Helsinki University Press.

Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology, 45*, 255–287.

Pajares, F. (1996). Self-efficacy beliefs in achievement settings. *Review of Educational Research, 66,* 543–578.

Pajares, F., & Valiante, G. (1999). Grade level and gender differences in the writing self-beliefs of middle school students. *Contemporary Educational Psychology, 24,* 390–405.

Palmer, D. H. (2009). Student interest generated during an inquiry skills lessons. *Journal of Research in Science Teaching, 46,* 147–165.

Patrick, H., Anderman, L. H., Ryan, A. M., Edelin, K., & Midgley, C. (2001). Teachers' communication of goal orientations in four fifth-grade classrooms. *Elementary School Journal, 102,* 35–58.

Patrick, H., Kaplan, A., & Ryan, A. M. (2011). Positive classroom motivational environments: Convergence between mastery goal structure and classroom social climate. *Journal of Educational Psychology, 103,* 367–382.

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of quantitative and qualitative research. *Educational Psychologist, 37,* 91–106.

Pekrun, R., Elliot, A. J., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: A theoretical model and prospective test. *Journal of Educational Psychology, 98,* 583–597.

Pekrun, R., Elliot, A. J., & Maier, M. A. (2009). Achievement goals and achievement emotions: Testing a model of joint relations with academic performance. *Journal of Educational Psychology, 101,* 115–135.

Pervin, L. (1983). The stasis and flow of behavior: Toward a theory of goals. In M. M. Page (Ed.), *Nebraska Symposium on Motivation 1982: Personality–Current Theory and Research* (pp. 1–53). Lincoln: University of Nebraska Press.

Pervin, L. (1992). The rational mind and the problem of volition. *Psychological Science, 3,* 162–164.

Pervin, L. (1996). Personality: A view of the future based on a look at the past. *Journal of Research in Personality, 30,* 309–318.

Pintrich, P. R. (2000a). An achievement goal theory perspective on issues in motivation terminology, theory and research. *Contemporary Educational Psychology, 25,* 92–104.

Pintrich, P. R. (2000b). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. *Journal of Educational Psychology, 92,* 544–555.

Prenzel, M. (1992). Selective persistence of interest. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 71–98). Hillsdale, NJ: Erlbaum.

Renninger, K. A. (1998). The roles of individual interest(s) and gender in learning: An overview of research on preschool and elementary school-aged children/ students. In L. Hoffmann, A. Krapp, K. A. Renninger, & J. Baumert (Eds.), *Interest and learning: Proceedings of the Seeon Conference on interest and gender* (pp. 165–174). Kiel, Germany: IPN.

Renninger, K. A. (2009). Interest and identity development in instruction: An inductive model. *Educational psychologist, 44,* 105–118.

Renninger, K. A., Ewen, L. & Lasher, A. K. (2002). Individual interest as context in expository text and mathematical word problems. *Learning and Instruction, 12,* 467–491.

Renninger, K. A., & Hidi, S. (2011). Revisiting the conceptualization, measurement, and generation of interest. *Educational Psychologist, 46,* 168–184.

Roeser, R. W., Midgley, C., & Urdan, T. (1996). Perceptions of the school psychological environment and early adolescents' self-appraisals and academic engagement: The mediating role of goals and belonging. *Journal of Educational Psychology, 88*, 408–422.

Roeser, R. W., Strobel, K. R., & Quihuis, G. (2002). Studying early adolescents' academic motivation, social-emotional functioning, and engagement in learning: Variable- and person-centered approaches. *Anxiety, Stress & Coping, 15,* 345–368.

Ronen, M., & Eliahu, M. (2000). Simulation – a bridge between theory and reality: the case of electric circuits. *Journal of Computer Assisted Learning, 16,* 14–26.

Rotgans, J. I., & Schmidt, H. G. (2011). Situational interest and academic achievement in the active-learning classroom. *Learning and Instruction, 21,* 58–67.

Ryan, A. M., & Shim, S. O. (2006). Social achievement goals: The nature and consequences of different orientations toward social competence. *Personality and Social Psychology Bulletin, 32,* 1246–1263.

Sadoski, M. (2001). Resolving the effects of concreteness on interest, comprehension, and learning important ideas from text. *Educational Psychology Review, 13*, 263–281.

Sadoski, M., Goetz, E. T, & Rodriguez, M. (2000). Engaging texts: Effects of concreteness on comprehensibility, interest and recall in four text types. *Journal of Educational Psychology, 92*, 85–95.

Salonen, P., Lepola, J., & Niemi, P. (1998). The development of first graders' reading skill as a function of pres-school motivational orientation and phonemic awareness. *European Journal of Psychology of Education, 13,* 155–174.

Schiefele, U. (2009). Situational and individual interest. In K. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 197–222). New York, NY: Routledge.

Schraw, G., Bruning, R., & Svoboda, C. (1995). Sources of situational interest. *Journal of Reading Behavior, 27,* 1–17.

Schraw, G., & Lehman, S. (2001). Situational interest: A review of the literature and directions for future research. *Educational Psychology Review, 13*, 23–52.

Schwinger, M., & Stiensmeier-Pelster, J. (2011). Performance-approach and performance-avoidance classroom goals and the adoption of personal achievement goals. *British Journal of Educational Psychology*, *81*, 680–699.

Schwinger, M., & Wild, E. (2012). Prevalence, stability, and functionality of achievement goal profiles in mathematics from third to seventh grade. *Contemporary Educational Psychology, 37*, 1–13.

Seifert, T. L. (1995). Characteristics of ego- and task-oriented students: A comparison of two methodologies. *British Journal of Educational Psychology,65*, 125–138.

Shim, S. S., Cho, Y., & Cassady, J. (2012). Goal structures: The role of teachers' achievement goals and theories of intelligence. *Journal of Experimental Education, 81,* 84–104.

Shim, S. S., Ryan, A. M., & Anderson, C. J. (2008). Achievement goals and achievement during early adolescence: Examining time-varying predictor and outcome variables in growth-curve analysis. *Journal of Educational Psychology, 100*, 655–671.

Sideridis, G. D., & Kaplan, A. (2011). Achievement goals and persistence across tasks: The roles of failure and success. *Journal of Experimental Education, 79,* 429–451.

Silvia, P. (2003). Self-efficacy and interest: Experimental studies of optimal incompetence. *Journal of Vocational Behavior, 62,* 237–249.

Silvia, P. (2005). What is interesting? Exploring the appraisal structure of interest. *Emotion, 5,* 89–102.

Sins, P. H. M., van Joolingen, W. R., Savelsbergh, E. R., & van Hout-Wolters, B. (2008). Motivation and performance within a collaborative computer-based modeling task: Relations between students' achievement goal orientation, self-efficacy, cognitive processing, and achievement. *Contemporary Educational Psychology, 33*, 58–77.

Skaalvik, E. M. (1997). Self-enhancing and self-defeating ego orientation: Relations with task and avoidance orientation, achievement, self-perceptions, and anxiety. *Journal of Educational Psychology, 89*, 71–81.

Skaalvik, E. M., & Skaalvik, S. (2013). School goal structure: Associations with students' perceptions of their teachers as emotionally supportive, academic self-concept, intrinsic motivation, effort, and help seeking behavior. *International Journal of Educational Research, 61,* 5–14.

Son, J. Y., & Goldstone, R. L. (2009). Fostering general transfer with specific simulations. *Pragmatics and Cognition, 17,* 1–42.

Sungur, S., & Senler, B. (2010). Students' achievement goals in relation to academic motivation, competence expectancy, and classroom environment perceptions. *Educational Research & Evaluation*, *16*, 303–324.

Thoman, D. B., Sansone, C., & Pasupathi, M. (2007). Talking about interest: Exploring the role of social interaction for regulating motivation and the interest experience. *Journal of Happiness Studies*, *8*, 335–370.

Thoman, D. B., Sansone, C., Fraughton, T., & Pasupathi, M. (2012). How students socially evaluate interest: Peer responsiveness influences evaluation and maintenance of interest. *Contemporary Educational Psychology, 37,* 254–265.

Tsai, Y., Kunter, M., Lüdtke, O., Trautwein, U., & Ryan, R. M. (2008). What makes lessons interesting? The role of situational and individual factors in three school subjects. *Journal of Educational Psychology, 100*, 460–472.

Tulis, M. (2013). Error management behavior in classrooms: Teachers' responses to student mistakes. *Teaching and Teacher Education, 33,* 56–68.

Tulis, M., & Ainley, M. (2011). Interest, enjoyment and pride after failure experiences? Predictors of students' state-emotions after success and failure during learning in mathematics. *Educational Psychology, 31*, 779–807.

Tuominen-Soini, H. (2012). Student motivation and well-being: Achievement goal orientation profiles, temporal stability, and academic and socio-emotional outcomes. Studies in Educational Sciences 245. University of Helsinki, Institute of Behavioural Sciences. Helsinki, Finland: Unigrafia.

Tuominen-Soini, H., Salmela-Aro, K., & Niemivirta, M. (2008). Achievement goal orientations and subjective well-being: A person-centred analysis. *Learning and Instruction, 18*, 251–266.

Tuominen-Soini, H., Salmela-Aro, K., & Niemivirta, M. (2011). Stability and change in achievement goal orientations: A person-centered approach. *Contemporary Educational Psychology, 36,* 82–100.

Tuominen-Soini, H., Salmela-Aro, K., & Niemivirta, M. (2012). Achievement goal orientations and academic well-being across the transition to upper secondary education. *Learning and Individual Differences*, *22*, 290–305.

Turner, J. C., Gray, D. L., Anderman, L. H., Dawson, H. S., & Anderman, E. M. (2013). Getting to know my teacher: Does the relation between perceived mastery goal structures and perceived teacher support change across the school year? *Contemporary Educational Psychology, 38*, 316–327.

Turner, J. C., Meyer, D. K., Anderman, E. M., Midgley, C., Gheen, M., Kang, Y., & Patrick, H. (2002). The classroom environment and students' reports of avoidance strategies in mathematics: A multimethod study. *Journal of Educational Psychology, 94*, 88–106.

Turner, J. C., & Patrick, H. (2008). How does motivation develop and why does it change? Reframing motivation research. *Educational Psychologist, 43,* 119–131.

Tyson, D. F., Linnenbrink-Garcia, L. & Hill, N. E. (2009). Regulating debilitating emotions in the context of performance: Achievement goal orientations, achievement-elicited emotions, and socialization contexts. *Human Development, 52,* 329–356.

Urdan, T. C. (1997). Achievement goal theory: Past results, future directions. In M. L. Maehr, & P. R. Pintrich (Eds.), *Advances in motivation and achievement* (pp. 99–141). Greenwich, CO: JAI Press.

Urdan, T. (2004). Using multiple methods to assess students' perceptions of classroom goal structures. *European Psychologist, 9,* 222–231.

Urdan, T. C., & Maehr, M. L. (1995). Beyond a two-goal theory of motivation and achievement: A case for social goals. *Review of Educational Research, 65*, 213–243.

Urdan, T., Mestas, M. (2006). The goals behind performance goals. *Journal of Educational Psychology, 98*, 354–365.

Urdan, T. C., & Midgley, C. (2003). Changes in the perceived classroom goal structure and pattern of adaptive learning during early adolescence. *Contemporary Educational Psychology, 28*, 524–551.

Urdan, T., Midgley, C., & Anderman, E. (1998). The role of classroom goal structure in students' use of self-handicapping strategies. *American Educational Research Journal, 35*, 101-122.

Urdan, T., Solek, M., & Schoenfelder, E. (2007). Students' perceptions of family influences on their academic motivation: A qualitative analysis. *European Journal of Psychology of Education, 22,* 7–21.

Urdan, T., & Turner, J. (2005). Competence motivation in the classroom. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 297–317). New York: Guilford Press.

Valsiner, J. (1992). Interest: A metatheoretical perspective. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 27–41). Mahwah, NJ: Lawrence Erlbaum.

Vauras, M. & Volet, S. (2013). The study of interpersonal regulation in learning and its challenge to the research methodology. In S. Volet & M. Vauras (Eds.), *Interpersonal regulation of learning and motivation: Methodological advances* (pp. 1-13). London: Routledge.

Veermans, M. (2004). *Individual differences in computer-supported inquiry learning – motivational analyses*. Annales Universitatis Turkuensis, B: 271. Turku: Painosalama Oy.

Volet, S., Vauras, M., & Salonen, P. (2009). Self- and social regulation in learning contexts: An integrative perspective. *Educational Psychologist, 44,* 215–226.

Volet, S., & Vauras, M. (Eds.). (2013). Interpersonal regulation of learning and motivation: Methodological advances. London: Routledge.

Vollmeyer, R., & Rheinberg, F. (2006). Motivational effects on self-regulated learning with different tasks. *Educational Psychology Review*, *18*, 239–253.

Wade, S. E. (2001). Research on importance and interest: Implications for curriculum development and future research. *Educational Psychology Review, 13,* 243–261.

Walker, C. O. (2012). Student perceptions of classroom achievement goals as predictors of belonging and content instrumentality. *Social Psychology of Education*, *15*, 97–107.

Walker, J. M. T. (2008). Looking at teacher practices through the lens of parenting style. *Journal of Experimental Education*, *76*, 218–240.

Wilhelm, P., & Beishuizen, J. J. (2003). Content effects in self-directed inductive learning. *Learning and Instruction, 13,* 381–402.

Williams, T., & Williams, K. (2010). Self-efficacy and performance in mathematics: Reciprocal determinism in 33 nations. *Journal of Educational Psychology, 102*, 453–466.

Wolters, C. A. (2004). Advancing achievement goal theory: Using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology, 96*, 236–250.

Wolters, C. A., Fan, W., & Daugherty, S. (2011). Teacher-reported goal structures: Assessing factor structure and invariance. *Journal of Experimental Education*, *79*, 1–29.

Wu, X., Lowyck, J., Sercu, L., & Elen, J. (2012). Self-efficacy, task complexity and task performance: Exploring interactions in two versions of vocabulary learning tasks. *Learning Environment Research, 15,* 17–35.

Yaman, M., Nerdel, C., & Bayrhuber, H. (2008). The effects of instructional support and learner interests when learning using computer simulations. *Computers and Education, 51,* 1784–1794.

Young, A. J. (1997). I think, therefore I'm motivated: The relations among cognitive strategy use, motivational orientation and classroom perceptions over time. *Learning and Individual Differences, 9,* 249–283.

Zimmerman, B. J., & Bandura, A. (1994). Impact of self-regulatory influences on writing course attainment. *American Educational Research Journal, 31,* 845–862.